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ABSTRACT

A longitudinal study of 20 experimental and 20 control preschool children identified at birth as being at high risk of suffering cultural-familial mental retardation is nearing completion. Ss (identified from a low income Milwaukee area) all have mothers with IQs below 75 and are of Negro extraction. The experimental intervention is composed of two components: a maternal rehabilitation program and an infant intervention program. Mothers are provided with adult education classes in basic academic subjects after which an occupational training program to teach specific vocational skills is offered. The infant program commences at 3-months of age and continues at a 5 day a week, year round program until the child enters school. Program characteristics include pairing of each infant with one consistent mothering figure and emphases on perceptual motor and cognitive areas. Children 3, 4, and 5-years-old receive instruction in language, reading, math/problem solving, as well as free choice activities. Preliminary findings indicate mean IQ scores of 127 for experimental Ss versus 92 for controls, better language abilities by experimental Ss, more mother-child verbal interactions by experimental Ss, and improved attitudes of experimental mothers. The final report of the program's effectiveness is to be published after the children have reached 7 years of age and spent some time in public school. (DB)

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REHABILITATION RESEARCH
AND TRAINING CENTER
IN MENTAL RETARDATION
UNIVERSITY OF WISCONSIN
MADISON

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Rehabilitation Research and Training Center
in
Mental Retardation
University of Wisconsin
Madison

REHABILITATION OF FAMILIES AT RISK FOR MENTAL RETARDATION¹

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FOREWORD

This is a progress report of a longitudinal study, now in its sixth year, designed to determine whether "cultural-familial," or "sociocultural" mental retardation can be prevented through a program of family intervention beginning in early infancy. It differs from previous "enrichment" or "early childhood education" projects in its focus on subjects who are, in the epidemiological sense, at very high risk of being identified as retarded, and in the commencement of intervention in very early infancy rather than at the age of three and four.

Because previous work suggests that performance increments attributed to enrichment may be, at least, partially lost during the first year of public school experience, the design of this study established age seven as the terminal evaluation point. About half of the experimental and control children entered public school in the fall of 1972 and most of the remainder will reach the age for school admission in 1973. As a consequence, age seven independent behavior evaluations will be completed, and a final comprehensive report issued, in 1974. This publication is offered as a report of results-to-date and is, in no sense, intended to convey final conclusions.

Chapter I

INTRODUCTION AND PROJECT DESIGN

This research represents an attempt to determine whether it is possible to mitigate or prevent intellectual deficits in "high-risk" children by comprehensive family intervention. The research design is intended to contribute to our understanding of the determinants of "cultural-familial" mental retardation. Over the past thirty years, no issue in the field has generated more intense, bitter controversy than that concerning the etiology of cultural-familial mental retardation. Nationwide interest in this question was aroused as a result of widespread public and professional recognition that this kind of retardation is almost exclusively found among economically depressed population groups, and that minority groups, disproportionately represented in disadvantaged populations, yield a particularly high prevalence. Certainly, in view of the fact that a large proportion of mental retardation is categorized as "cultural-familial", achievement of a more adequate understanding of etiological factors in cultural-familial mental retardation is of utmost practical concern.

The Concept of "Cultural-Familial" Mental Retardation

Although there has been no adequate national survey of the prevalence of mental retardation in this country, it is generally accepted that one may consider about three percent of the population to be identifiable as mentally retarded. In about 80 percent of this group there is no identifiable gross pathology of the central nervous system. It is this group, without identifiable pathology of the central nervous system, which is almost exclusively found among the populations of economically depressed urban and rural areas. This constellation of factors is often referred to as the "cultural-familial" mentally retarded.

The nature of mental retardation is, of course, a function of an entirely arbitrary definition. The concept has varied between societies as a function of differences in technological sophistication and in social philosophy, and has varied over time as a function of technological and social changes within a given society. The concept has varied between scientific and professional disciplines as a function of their particular biases.

The most nearly universal, contemporary, definition of mental retardation in the United States, requires that a suspicion of mental retardation established on the basis of measured intelligence be confirmed by clinical judgment of the adequacy of the individual's actual adaptive behavior.

Measured intelligence greater than one standard deviation below the mean (a statistical term which expresses the dispersion of scores in the standardization sample) is arbitrarily set as the cutoff point for consideration of possible retardation. This cutoff point is equivalent to a test score of about IQ 84 on the most commonly used individual tests of general intelligence. Only a small proportion of persons near the cutoff point are actually diagnosed as being mentally retarded, inasmuch as their adaptive behavior is not questioned. As measured intelligence becomes lower, increasing percentages of persons falling in that intelligence range are identified as mentally retarded.

In actual practice, in the United States, individuals with measured intelligence at two standard deviations or more below the mean (about IQ 70 for most individual tests of intelligence) are classified as retarded on the basis of their IQ scores alone. An IQ level of about 75 and below would include very close to 100 percent of all individuals in the United States who are identified and treated as mentally retarded.

There are literally scores of specific diseases and conditions which have been known to produce damage to the brain and eventuate in retardation. These can be grouped in the following categories:

1. Infections which involve the central nervous system of the infant or young child.
2. Physical injuries to the brain before, during, or after birth.
3. An array of disorders of metabolism, some of which are genetically determined, which damage the nervous system.
4. Conditions of genetic or unknown cause which involve abnormal growths within the brain.
5. Diseases of genetic or unknown origin which result in a progressive degeneration of the central nervous system.
6. An array of prenatally determined conditions which involve physical defects of the brain or which present distinctive physical characteristics.

Estimates are that no more than 20 percent of the total population of mentally retarded present demonstrable pathology in the structure or functioning of the central nervous system. This type of retardation, in which pathology of the central system is a presenting feature, is fairly evenly distributed throughout all socioeconomic, ethnic, and racial groups. Furthermore, it is generally, although not always, associated with measured intelligence greater than three standard deviations below the mean (or less than IQ 55 on the major tests). Affected persons tend to function either as trainable or nontrainable pupils in school; or as profoundly or severely impaired in adaptive behavior in adult life. They are also likely to have associated secondary physical disabilities.

By contrast, the remaining 80 percent of all mental retardates do not present obvious gross pathology of the central nervous system. It is this group which is designated as the "cultural-familial" mentally retarded. A small number from among this group appears retarded because of long-standing emotional or psychotic disorders of childhood which have interfered with learning. A few may be retarded because of a disability, such as impaired vision or hearing, or cerebral palsy, which has resulted in a restriction of learning opportunities essential to normal intellectual development. The greater proportion of this group, however, are persons who appear quite normal in the physical sense; they simply function as mentally retarded.

The basic cause of this type of retardation is unknown. Factors of inheritance of intelligence have been implicated. Inadequate prenatal care among low socioeconomic group mothers, high rates of prematurity, and inadequate infant health supervision are other factors present in "high-risk" groups which may be related to mild central nervous system insults, and are not demonstrable by present methods of examination. There is some evidence to suggest that deprivation of social stimulation essential to normal intellectual development may be a contributing etiological factor in this group.

These persons without demonstrable nervous system pathology most often have mild degrees of retardation as measured by intelligence tests. That is, most of this group fall in the range of IQ 50 to 75. The schools usually consider them to be educable children; they generally exhibit moderate or mild impairments in adaptive behavior.

The label "cultural-familial" does not imply etiological factors but rather reflects: 1) the statistical association between mental retardation and certain subgroups in the general population; and 2) the high probability that more than one member of the cultural-familial family is also retarded. The designation further requires: 1) that there be no evidence of biological factors or organic conditions which could account for the intellectual deficit; and 2) that there be at least one parent or one sibling who is functioning sub-normally. The latter criterion is often not carefully evaluated, most probably because it is too difficult to obtain this information. Thus, in the absence of a plausible organic explanation of the retardation, those persons who obtain IQ scores between 50 and 75 are usually designated "cultural-familial retarded".

Prior to World War II, surveys of the distribution of intelligence test scores among these economically deprived population groups were widely cited in support of theoretical views concerning the genetic determinants of intelligence. In particular, they were used to support the view that "cultural-familial" mental retardation was a direct function of hereditary determination.

In recent years there has been a less rigid adherence to this view, since we have become increasingly sophisticated in understanding the nature of measurement of mental abilities using standardized tests. Furthermore, the complex interactions involved in the expression of genetically-related behavioral characteristics are becoming more obvious. However, with the advent of social concern for the country's poor and those minority groups mostly found among the poor, there has been increasing acceptance and little critical challenge to the view that the high frequency of mental retardation found among the poor is directly attributable to deprivation of opportunities (available to the "non-poor") to learn and practice intellectual skills. Statistics demonstrating a higher incidence of prematurity and other complications of pregnancy and delivery among economically disadvantaged population groups are sometimes cited as an explanation of increases in the prevalence of mental retardation among this group. But, it is clear that differences in prevalence of these conditions can by no means account for the substantially greater differential in prevalence of mental retardation. And so the social-deprivation hypothesis is predominant in spite of the fact that this view of etiology of "cultural-familial" mental retardation has little research evidence to support it, beyond casual observations of the kind of learning opportunities of which children in poor families are presumed to be deprived and statistics which show that the average intelligence test score of slum-dwelling children declines as they grow older.

The Epidemiology of "Cultural-Familial" Mental Retardation

Prior to initiation of the longitudinal study reported here, we initiated a survey of an economically disadvantaged urban area in order to learn more about the distribution of mental retardation among a "high-prevalence" group. We surveyed a residential area of the city of Milwaukee characterized by 1960 census data as having the lowest median family income, the greatest rate of dilapidated housing, and the greatest population density per living unit. Over a six-month period, all families residing in this area with a newborn infant, and at least one other child of the age of six, were selected for study. This selection procedure was intended to provide us with a broad range in age of children. The purpose of the study was to provide clues as to methods of identifying those families among the economically-disadvantaged population group with a high probability of producing a retarded child.

The major survey finding of relevance to the present study was that the variable of maternal intelligence proved to be the best single predictor of low intelligence in the offspring. As seen in Table 1, mothers with IQ's less than 80, comprising less than half the total group of mothers, nevertheless accounted for almost four-fifths of children with IQ's below 80 (Heber, Dever, Conry, 1968, p. 8).

Table 1-1

DISTRIBUTION OF CHILD IQ'S AS A FUNCTION OF MATERNAL INTELLIGENCE

Mother's IQ	Percent of Mothers	Children's IQ		
		% > 90	% 80-90	% < 80
> 80	54.6	65.8	47.3	21.8
< 80	45.4	34.2	52.7	78.2

This relationship held even more strongly for older than for younger children as can be seen in Table 2 (Heber, Dever, Conry, 1968, p. 8). That is, it can be noted that the mean measured intelligence of offspring of mothers with IQs above 80 is relatively constant as age increases.

Table 1-2

DISTRIBUTION OF IQ'S OF CHILDREN SIX YEARS AND OLDER
AS A FUNCTION OF MATERNAL INTELLIGENCE

Mother's IQ	Percent of Mothers	Children's IQ		
		% > 90	% 80-90	% < 80
> 80	54.6	68.0	51.6	19.2
< 80	45.4	32.0	48.4	80.8

However, the children of mothers with IQs below 80 show a progressive decline in mean intelligence as age increases (Fig. 1; Heber, Dever, Conry, 1968, p. 8). In other words, the generally acknowledged statement that slum-dwelling children score lower on intelligence tests as they become older held true only for the offspring of mothers whose IQs were below 80. Further, the survey data showed that the lower the maternal IQ, the greater probability of her children scoring low on intelligence tests. For example, the mother with an IQ below 67 had a roughly fourteen-fold increase in the probability of having a six year old child test below IQ 75 as compared with the mother whose IQ fell within the average range.

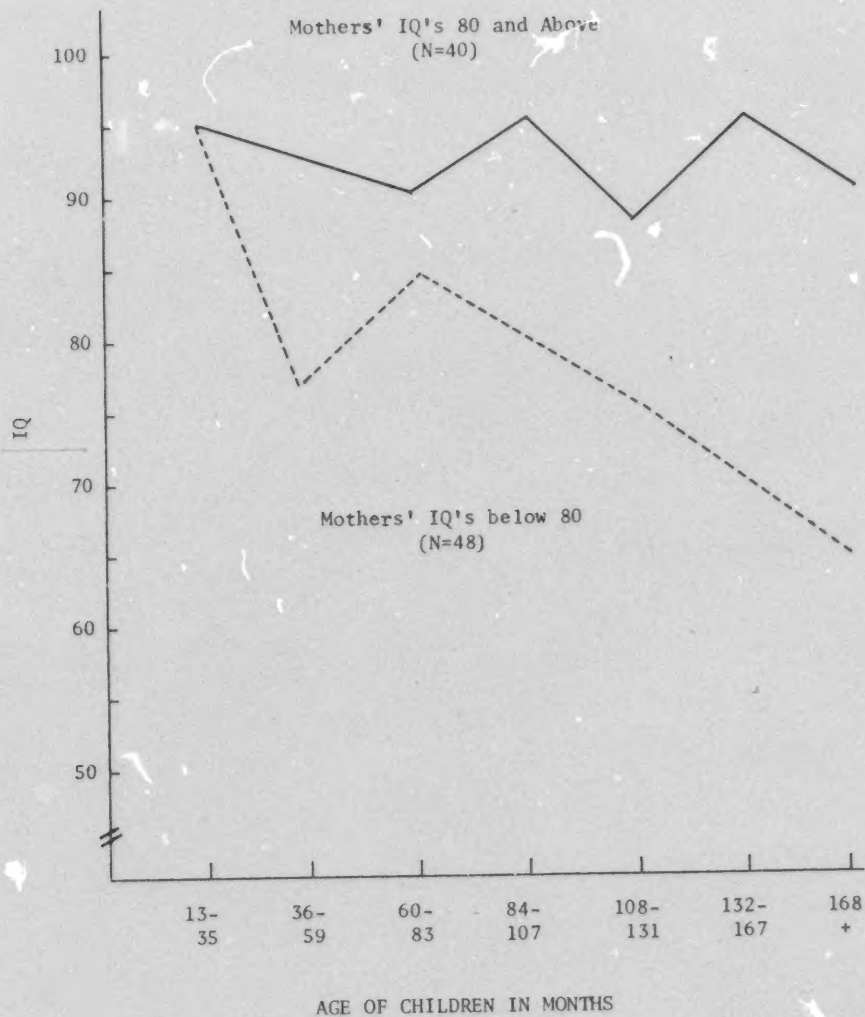


Fig. 1. IQ Decrements in Disadvantaged Children Whose Mothers are Mentally Retarded

(ref: Heber, Dever, Conry, 1968).

The selection procedure followed in this initial survey, that is, taking a mother with a newborn, and a child of the age of six, drew extraordinarily large size families into the net. Further, fathers were not evaluated. In a second survey we took the families of over five hundred consecutive newborns in our study area. They were given an extensive interview schedule, and in addition to the mothers, fathers and all other children over the age of two were administered the Peabody Picture Vocabulary Test (PPVT) of intelligence. Most striking, as seen in Table 3, was the congruence of maternal and paternal IQ. Sixty-two percent of mothers below 70 had husbands who scored below 70 and only 12% of those mothers had husbands who scored above 100. By contrast, mothers scoring above 100, in no case, had a husband who scored below 80.

Table 1-3

PERCENTAGE OF FATHERS IN PQ GROUPINGS
AS A FUNCTION OF MATERNAL PQ LEVEL

		Father PQ		
		< 70	70-99	100+
Mother PQ	< 70	.62	.26	.12
	70-99	.28	.50	.22
	100+	.00	.41*	.59

*No fathers in 70-79 range

As can be seen in Table 4, the average age of mothers of newborns was comparable for all three IQ groups but as is shown in Table 5, there is a substantially greater number of mothers under CA 20 and over CA 35 in the below 70 IQ group. This is reflected in Table 6 in the substantially greater number of offspring in families where both mother and father tested below 70. There is an average difference of 1.2 children between these families and those where the mother and father tested above 100; and considering that the families are, on the average, perhaps about half-way through their child-rearing years, the total difference in the number of offspring in completed families might be on the order of two and one-half.

Table 1-4

MEAN MATERNAL AGE AND PERCENT OF ABSENT
FATHERS AS A FUNCTION OF MATERNAL IQ

Maternal PQ	< 70	70-99	100+
% Fathers Absent	34.5	38.6	35.0
Mean Maternal Age	25.4	25.8	25.1
N	119	280	120

Table 1-5

PERCENT OF MOTHERS OF NEWBORNS IN VARIOUS AGE GROUPS
AS A FUNCTION OF PEABODY QUOTIENT

		Maternal PQ		
		< 70	70-99	100+
Maternal Age	< 20	.17	.16	.11
	20-34	.68	.77	.82
	35+	.15	.07	.07
	N	119	280	120

Table 1-6

MEAN NUMBER OF OFFSPRING

		Father PQ		100+	None	Mean
		< 70	70-99			
Mother PQ	< 70	4.63	2.95	1.5	4.24	3.41
	70-99	3.42	3.39	3.21	3.65	3.50
	100+	--	3.06*	3.43	3.05	3.20
	Mean	4.02	3.25	3.14	3.64	

*No fathers in 70-79 range

At first glance, these population survey data seem to suggest direct support for the genetic hypothesis of etiology of cultural-familial mental retardation. However, simply casual observation suggested that the mentally retarded mother residing in the slum creates a social environment for her offspring which is distinctly different from that created by "ghetto-dwelling" mothers of normal intelligence. These observations and our survey data engendered our concern with an approach to rehabilitation of the family, rather than, simply, the individual retarded adult. The ability to select families "at risk" for mental retardation on the basis of maternal intelligence makes it possible to initiate study of "high-risk" children before they become identified as mentally retarded. Thus, the results of the surveys of an economically disadvantaged population with an overall high rate of mental retardation suggested the direction and concern of the particular study discussed in this report.

Project Design

The set of contiguous census tracts selected for purposes of conducting the series of "high-risk" population surveys, also comprised the area from which our sample was drawn for this study. In brief, this area comprised about two-and-a-half percent of the population of Milwaukee but yielded about one-third of the city's educable retarded public school children. According to 1960 U.S. Census Bureau data, the tracts comprising this area were rated in the lowest category (for Milwaukee) in terms of median educational level and income, and in the highest category in terms of population density per living unit, percent housing rated as dilapidated and unemployment.

As a consequence of the survey data, we have utilized maternal IQ as a basis for selection of a group of newborns, with confidence that a substantial percentage would be identified as mentally retarded. In other words, to identify the "high-risk" families within the "high-risk" residential area, the variable of maternal intelligence was utilized as a selection criterion since it proved to be the most efficient predictor of low school-age offspring intelligence.

A full-scale W.A.I.S. IQ of less than 75 was utilized as the selection criterion in accumulating a sample of 40 families. As babies were born in our study area, trained surveyors employed by the University of Wisconsin Survey Research Center contacted the family within a few weeks of birth and completed a family history questionnaire which included a vocabulary screening test administered to the mother. Those mothers falling below a cut-off score on the vocabulary test were administered a full-scale WAIS by a trained psychometrist. An additional selection criterion was that the sample was restricted to families of Negro extraction. The basis for this

decision was: 1) Negro families residing in the study area were less mobile than were the Caucasian families according to 1960 Census data suggesting that attrition would be less of a problem for black families; 2) the desire to minimize potential culture and race-related problems within the group of experimental families.

It was not possible to accumulate a sample of forty families where the mother met the WAIS selection criterion and then randomly assign to Experimental and Control group because of the design requirement that intervention be initiated as early in infancy as possible. Our projections suggested that our screening procedures would identify about three families a month meeting criterion, requiring a little better than one year to accumulate our full sample. In actual fact, our projections were somewhat off and a total of eighteen months was actually required to generate the total sample.

Because of consideration of logistics of preparing infant intervention staff, transportation of infants to the infant center, etc., it was decided to assign infants to experimental and control groups on a monthly basis rather than on an alternating one-by-one basis. As mentioned above our projections that this would result in an accumulation of three to four subjects per month did not hold so that in some periods a two month interval was required to produce an increment of three or four to the control group.

Although this procedure constituted a deviation from strictly random assignment, it should be emphasized that only the happenstance of month of birth dictated group assignment. At no time did factors such as condition of the infant at birth, economic or domestic status of the family, etc., dictate group assignment. Statistical analysis of differences in all measures present and known at time of birth, such as birth weight and height, recorded abnormality of delivery or condition of the infant at birth, marital status of family, economic status, and number of siblings were not significant.

The design of the study simply called for a comprehensive intervention into the experiential environment of experimental infants beginning as soon as was feasible after birth (with CA 3 months) and continuing to the age of regular school entry (CA 6). The nature of this intervention is described in the next chapter. Its objective was to provide experiences, potentially lacking in the natural environment of the "high-risk" infant, designed to facilitate the development of cognitive skills. A comprehensive schedule of standardized and non-standardized measures of behavioral development was set from infancy to age seven where independent behavior evaluations are scheduled as the project's terminal point. These measures and present data are discussed in subsequent chapters.

CHAPTER II

THE FAMILY REHABILITATION PROGRAM

As discussed earlier, the family intervention program was designed to modify the presumably adverse factors in the natural environments of the experimental "high-risk" infants and provide learning opportunities which would facilitate the acquisition of skills which contribute to, and are a part of, cognitive development. Our objective was to intervene positively in every component of the experiential environment related to the development of cognitive skills. As a result, the "experimental treatment" is highly complex and any effects of intervention cannot be attributed, unequivocally, to any particular component of the intervention program. This approach was deliberate on our part; it seemed to us to be a more efficient strategy to determine, first, if one could significantly alter the course of intellectual development by intervening in a comprehensive way. If so, subsequent research can identify the essential, critical components of experiential intervention. The intervention program can be divided into two major components -- maternal intervention and infant intervention -- which are described in the two following sections.

The Maternal Rehabilitation Program

Our choice of the mother, as the principal object of parental intervention, was predicated by our belief that, generally, she is the parent who is the principal teacher of behavioral skills to the infant. Therefore, she must become the essential focus of any effort to modify the "in-house" learning environment. Further, our prior knowledge of the population, suggested that there would be no father present in about one-third of the families, and that in many of the remainder, he would be unavailable for any intensive program because of employment or other reasons.

Nevertheless, a number of fathers did become actively involved. They were interested in the infant intervention program and attended and participated in the parent-staff meetings conducted as part of that program. Some fathers, on their own initiative, occasionally attended the "classroom" sessions held for mothers. Because of the very nature of our selection process, the available fathers were frequently the more competent parent, and, in retrospect, it was likely an unwise decision to have designed an almost exclusive focus on the mother.

A two phase program was initiated to prepare the experimental mothers for employment opportunities, as well as improve their

homemaking and child-rearing skills. Through improved employment potential, increased earnings, and self-confidence, it was hoped that positive changes in the home environment would occur. The rehabilitation program for the mothers consisted of adult education classes designed to provide the basic academic tools necessary for vocational adaptability. Then, an occupational training program was instituted, to teach specific vocational skills.

An effort was made to have all mothers from the experimental group participate in the two phases of the program. While all twenty mothers participated in some phase of the training program, every mother did not always participate. The reasons for their saltatory participation included marital and family problems, motivation, personality conflicts, employment and subsequent pregnancies.

The job training program utilized two large, private nursing homes in Milwaukee. The choice of private business settings for training was dictated by the strong resistance on the part of the mothers against involvement with community agencies. The nursing homes were chosen as training sites for the appropriateness of job skill areas represented in the facilities and availability of professional staff with an understanding of rehabilitation problems. Furthermore, there were great employment opportunities available in nursing homes and other chronic care facilities, after training was completed.

Because many of the mothers scored low on literacy and occupationally oriented achievement tests, the program initially emphasized the basic skills of reading and arithmetic, as a prerequisite for on-the-job training. Classes were conducted four days per week for one month before phase II (on-the-job training at the nursing home) was initiated. In addition, their curriculum included community oriented social studies, home economics, interpersonal relations and child care.

When the training program shifted to the nursing home, it became apparent to the supervising staff that the mothers were acquiring a group spirit which was serving to enhance positive attitudes for work and achievement. Those mothers who were having difficulty adjusting to a didactic milieu for various (oftentimes familial) reasons were frequently enjoined in some manner by the other group members into participating. In many ways the result was a therapeutic situation for the group. The defenses with which some of the mothers entered the program were quickly dismantled. For example, one mother, who never in her life had held a job for longer than three weeks, would often verbally attack her teacher and peers during the initial stages of the academic training program. Like other women in the program, she had been reluctant to join, not only because of her children at home, but because she felt that her inability to read well would preclude ever obtaining a job -- a problem that nothing could rectify. She even acknowledged at a later time that she had convinced herself that she could not hold a job because of her academic deficits. She was not sure that after so many years away from school, she could learn to read and write better. The mothers gathered around this woman and

through long, heated, usually emotional conversations, which many times interrupted classroom instructions, talked over her fears and other problems. Sometimes, on weekends, they talked over coffee in one of the mother's homes. Finally, she began to realize that she did have the ability to finish the program. She concluded the training with a high skill rating and is currently employed as a nursing assistant.

Another mother who came into the program with a skeptical attitude and continually interrupted the instructors, was swept into the serious mood of the other women who were determined to improve themselves. Toward the end of the program, one Saturday evening there was a knock on her door; in came her classmates with a big cake to celebrate both her completion of the program and the remarkable, positive change in her attitude. Almost to a one, they had disliked the way this woman had chided the instructor and disrupted class by whining, arguing, and name-calling. When these devices did not win the attention she sought, they faded out. Peer pressure more than anything seemed to bring her and other recalcitrants into the spirit of the program. She finished the vocational training and is now employed as a dietary aide on a full-time basis.

During phase II, the mothers received 26 weeks (three days per week) of vocational training, most of which was on-the-job training. Many of the women who were doing only moderately well in the academic phase suddenly renewed their interest and enthusiasm in the program when academic skills became applied (see Table 2-1).

The method devised for training was to pair each mother with an experienced employee. When a mother encountered difficulties that her workmate could not resolve, she was removed from the work situation, given special help and then returned to the work area.

During the vocational training phase, the mothers were trained in four different areas of Health Services: nursing assistant, dietary aide, housekeeping and laundry. Each mother was allowed to progress according to her individual learning rate. Group counseling sessions were held at the end of each day of training. After vocational training was completed, each mother was evaluated by her training site supervisor in each area on the Revised Jewish Vocational Service Employability Rating Scale. Only one mother received a borderline rating. The others were evaluated as being employable.

Not all mothers who completed the vocational training program sought jobs for which they were specifically trained. One woman who was taught skills for becoming a nursing assistant, decided she preferred sewing and found a job as a seamstress. "I want to try something I have never done before," she told her peers. Subsequently, this woman has moved her family into a better home and neighborhood.

While the vocational component of the maternal program appears to have been highly successful to date, various problems in the adequacy of homemaking skills and care and treatment of children

Table 2-1
OVERVIEW OF VOCATIONAL TRAINING PROGRAM FOR HIGH-RISK MOTHERS

Vocational Training Area	Time Devoted to Training	Examples of Some of the Tasks in the Area
Laundry	5 weeks	1. Feeding linens into the mangle 2. Folding garments as they are ironed 3. Sorting clothes 4. Operating laundry machinery 5. Mending by hand and machine
Housekeeping	3 1/2 weeks	1. Preparation of cleaning materials cart 2. Learning serial order for room cleaning, e.g., sweeping before mopping, etc. 3. Performing all cleaning tasks with speed and thoroughness
Food Service	9 weeks	1. Stocking and inventorying food items 2. Preparing foods for the cook, e.g., peeling, chopping, cleaning, etc. 3. Cleaning utensils 4. Preparing salads and desserts 5. Operating food preparation equipment, e.g., blender, peeler, etc. 6. Preparing special diet trays
Nursing	9 weeks	1. Helping patients, e.g., feeding, dressing, bathing, shaving and transporting them 2. Taking temperatures and counting pulse 3. Caring for the incontinent patient

remain unresolved in a number of Experimental families. As the mothers became successfully employed, the maternal program shifted to an increased emphasis on training in general care of family and home, budgeting, nutrition and food preparation, family hygiene and the mother's role in child growth and development. It has not proven possible for us objectively to evaluate "in-home" behavior changes on the part of the mothers in these areas.¹ At the conclusion of the project, the best we may be able to achieve is an assessment of maternal behavior changes based on informal staff contacts and structured interview data with our families over the seven year period of the project:

The Infant Intervention Program

The direct infant intervention program commenced at about three months of age for the experimental infants and was designed to continue to age six when the child enters regular public school. The infant program is carried on an all-day basis, five days a week, twelve months a year. It is housed in a leased school facility located in the residential area of the research families. The children are transported each day between the school and infant center by the project staff.

The general goal of the infant intervention program was to provide an environment and a set of experiences which would allow each child to develop to his potential intellectually as well as socially, emotionally and physically. The specific focus of the educational program was to prevent from occurring those language, cognitive (e.g., problem solving and concept formation) and motivational problems which are known to accompany mild mental retardation in primary school children. Therefore, the infant educational program focuses heavily on language and cognitive skills and on maintaining a positive learning environment for the children.

The discussion of the intervention program is divided into two age sections: the infancy period (up to 24 months) and the early childhood period (24 to 72 months). Each of the two sections includes: 1) an explanation of the content areas of the curriculum; 2) a description of the educational setting; 3) the logistics of the program schedules, teacher-child ratios; and 4) an overview of each curriculum area with samples of specific activities.

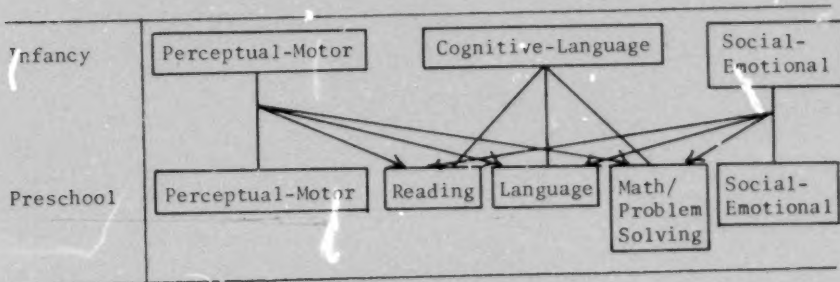
While this type of information may clarify certain aspects of the program, it may cause some confusion in other areas which are equally important. For example, we discuss the period of infancy and early childhood separately for the needs of the children and the approach program based on these needs are different, however, continuity was maintained in the learning program. While one cannot point to a direct relationship between acquiring a skill in infancy and success in learning to read, it may be that the strategies used to solve one problem influence later problem solving experiences.

¹In order to illustrate the general character of within-family life found among our "high-risk" group, anecdotal descriptions are provided.

Although we discuss the curriculum in terms of separated areas and related activities, we designed the educational program so that the children were exposed to the widest range of experiences. In other words, the program was designed so that the children were not restricted by these areas nor limited to these activities. To this end, an eclectic approach in regard to educational theories was chosen. While the amount of information on child development is impressive, it is likely that no one theory is complete enough to warrant its adoption exclusively from infancy to age 6. We have attempted to create a curriculum that combines aspects of many theories while at the same time remains flexible enough to be individualized for each child and for our group of children as a whole.

Within the educational program, the general cognitive language and social goals were similar for each child, yet no two children have been exposed to the same program. Since children learn at different rates (depending on many factors, among them activity, mood, time of day), and differ in their style of learning, we attempted to maximize the effects of the educational experiences for each child. In practical terms, this meant that while all children experienced learning activities that were presented in small steps with opportunities for positive, supportive feedback, the breakdown of task components, the length of tasks, types of material used, size of group and methods of presentation varied from child to child and group to group. A more detailed discussion on organizing environments for flexibility and individuality can be found in the introduction to the preschool curriculum.

The curriculum has been divided into content areas. Aspects of each content area were defined and were constantly being modified and expanded by the curriculum coordinators together with the teachers. The following diagram shows, in a very general way, the content areas and their development within the educational program.



Subject areas were delineated for the purpose of organization of the daily program. However, this should not imply that each content area was a discrete unit. All of the areas are closely inter-related, encompassing not only similar concepts but also similar processes. In infancy, emphasis was placed on cognitive-language, social-emotional and perceptual-motor development. In the preschool

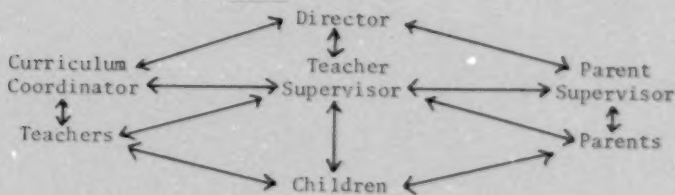
years, the emphasis was on the breakdown of the cognitive-language area into three overlapping units, with perceptual-motor functioning and social-emotional growth underlying all areas of the curriculum.

It is important that the reader not interpret the presentation of lists of activities and schedules to imply a static curriculum. Quite to the contrary, the curriculum as it is presented here has evolved through many years of additions and adaptations. An on-going process of curriculum development is vital to any educational environment, because it allows the program to respond to the needs of a specific group of children at a specific time. We fully expect that within the next year changes again will be made. The value, then, in the presentation of a curriculum is not whether it can be used exactly for another group of children, but rather that ideas on structure, activities, or emphasis, can be adapted to the benefit of other pre-school programs.

Preceding the presentation of the Infancy and Preschool Program is a discussion of the staff of the program; who they are, their training and responsibilities.

The Staff

The staff of the educational program is composed of the director, a curriculum coordinator, a teacher supervisor, parent supervisor, and the teachers. The interrelationships between them can be charted as follows:



All but one of the teachers employed are paraprofessionals. The teachers chosen were, in our judgment, language facile, affectionate people who had had some experience with infants or young children. The majority of the "teachers" resided in the same general neighborhood as the children, thus sharing a similar cultural milieu. The teachers' educational experiences ranged from 10th grade to a master's degree. Within the classroom, all the teachers are on equal status. No teacher has been in the program less than three years, with the majority working for five or six.

The teachers are the most important element in the child's environment. Recognizing this, adequate on-going teacher training was vital to the educational program. It was the teacher's job to structure the environment to maximize learning by choosing appropriate

equipment and activities, and by promoting new skills. In the infancy period, it was especially important for the teachers to become sensitive to the patterns of growth and needs of her particular infant. It was her responsibility to plan the day around the infant's eat/sleep cycle and to have activities planned for both the infant's active and passive periods. During the preschool period, the teachers were responsible for structuring activities for a group of children within one content area. The job of a teacher within the educational environment was a difficult one, requiring a person to be sensitive to the emotional as well as the educational needs of each child. Therefore, the teacher training program included three main aspects: 1) formal instruction, 2) on-the-job training, and 3) annual seminars.

Formal Instruction

During the early part of the program, group instruction was held bi-weekly. As competencies were gained, instruction was held weekly. At the present time after a minimum of three years training and experience, instruction and discussion are held every second week.

For practical purposes each instruction session was divided into two sections. The first section was devoted to discussions around a given topic designed to reach the goals specified below. The topics for the second portion were generated by group needs, either for information or for examining approaches or attitudes as they relate to the classroom situation.

1. Knowledge of child development with an emphasis on the first six years of life.
2. Knowledge of approaches to early childhood education and the related philosophies.
3. Developing an understanding of the overall curriculum goals.
4. Developing special skills in one of the following areas: math/problem solving, reading readiness, language.
5. Understanding methods of motivating and interacting with groups of children.
6. Developing an awareness of children's needs by being a sensitive observer and interpreter.
7. Understanding the importance of the environment: physical, social, emotional, scheduling activities.
8. Understanding and utilizing evaluation techniques.
9. Understanding health needs in the center.
10. Understanding appropriate methods and purposes for discipline in the educational center.

On-the-Job Training

A vital aspect of the teacher training program was the On-the-Job Training. Each teacher was observed and evaluated by the curriculum coordinator and teacher supervisor. From the observations, the teacher was given help in planning her instructional units, in choosing appropriate equipment and in motivating the children. Small group teacher meetings were held to discuss a particular child, a specific teaching area or a peer group of children. Other teacher training techniques included the teachers evaluating themselves and observing each other by videotape recordings.

At staff meetings, problems concerning the center were discussed as were attitudes toward children, teaching techniques, future plans and general activity brainstorming.

Annual Seminars

Each year, we held three day seminars outside the educational center. They provided an opportunity to expand information and experience, visit other programs, hear guest speakers, participate in workshops, and to hold intensive staffing sessions during which each child's progress in the center was considered, and specific planning for the following year was discussed. Not only were the annual seminars a time in which program and staff problems could be worked out apart from the children, and staff consistency discussed and developed, but seminars also created renewed excitement among the teachers.

Infancy Program

By the time a child is two years old, he has begun to communicate, he actively explores, manipulates and gives order to his environment. His daily experiences and accomplishments are far too numerous to record. In fact, recent research in infancy has demonstrated that children learn simple tasks (Lipsitt, 1967) and even indicate preferences (Fantz, 1967) within the first few weeks of life. Studies of the depressing effects of early severe deprivation on normal development, coupled with knowledge about the early and rapid cognitive growth which occurs during this period, would justify conceptualizing infancy as a time when the foundations of learning are laid.

Learning Environment

Teacher-Child Interaction

All of the children entered the program at about three months of age. Because the children were so young, certain precautions were taken to insure a warm supportive relationship with an adult. First of all, each teacher went to the home of her infant, watched the mother care for the child and then gradually took over the care of

the baby. When the mother felt confidence in the teacher, she gave permission for the child to be brought to the learning center. At the center, the ratio remained on a one-to-one basis, with each teacher caring consistently for the same infant. At approximately 12 months, two teachers shared the responsibilities for two infants, so that by 15 months, two children shared one teacher. At about 18 months, all the same age children were grouped together with three teachers in a transition program. The purpose of this transition period was to orient both the children and their teachers to the preschool program which began between 20 and 24 months.

Thus, each infant was paired with one consistent mothering figure or "teacher" in an effort to provide an environment which would support the growth of primary social attachments. Care was also taken to establish a relationship with at least one other adult in an attempt to continue providing a secure environment if a child's teacher became ill or left the program. Because of the dependency of infants on adults, a one-to-one ratio also afforded us the opportunity to insure that each child's needs, moods, and interests were cared for and that the day was planned according to each child's eat-sleep cycle. This flexibility in programming enabled each teacher to plan appropriate activities so that her infant could acquire new skills and practice those skills he had already attained.

Feeding and related care-taking activities which the infant experienced during a part of each day were viewed not only as routine necessities, but as soothing experiences which helped to develop the necessary emotional attachment between the child and the teacher.

Finally, the child's feelings of self-worth were promoted by attentive teachers who not only attempted to plan activities within his ability, but who also provided support, encouragement and positive feedback about the child's attempts to understand and deal with his world. Photographs of the children were used in books to further their self-awareness and self-concept.

A note of caution should be mentioned here. Although it was important that the teacher and infant have a strong relationship with each other, it was also necessary as the child grew that this bond be weakened. By slow transition periods, this was achieved with no observable ill effects upon the children.

In training the teachers to work specifically with infants in a cognitive-language program, we held both group meetings and individual planning sessions to help the teacher observe, plan and expand concepts, as well as evaluate the infant's progress within the framework of an increased understanding of patterns of child growth and development.

One technique used to refine the teacher's observation skills was to ask each teacher to respond to questions about her infant: What makes him laugh? What frustrates him? Individual help was given in planning lessons, while at the meetings, ways of expanding

concepts were discussed. The discussion might for example focus on household items (block, paper cup) with the teacher noting the number of ways the item could be used with the infant. To facilitate observation, developmental checklists (Appendix IIA) were filled out by each teacher and discussed with the supervisor. These sheets were used as a basis for discussion rather than as a measure of the child's progress. Such discussions also served to provide the curriculum coordinators with cues as to further training needs of the teachers. The curriculum coordinators after observation and discussion presented each teacher with activity ideas written for her specific infant (Appendix IIB).

Learning Areas

In infancy, the center was divided into small rooms or partitioned areas. Each infant and teacher shared a small area which included the child's crib, a comfortable chair for the teacher, a feeding table, a number of small manipulative toys. The children shared a large gross motor room that had among other things, a small slide, large cardboard building blocks, wagons and scooters. Books, records and other manipulative equipment were kept in a central area available to all the teachers. At around 10 months, the children began eating together, and at 15 months the cribs were all placed in one room.

Regarding the environment, the rooms were bright and colorful and included nooks and crannies where a child could be rewarded for exploration by the discovery of desirable toys. To maintain a child's curiosity, a variety of objects and activities were always available. Variety need not be different objects, since children appear to be most interested in objects that are familiar but which are presented in a slightly different manner or appear in a slightly different context than is usual. The same equipment was utilized in different ways (cups - sorting, stacking), as was the same activity varied along different attributes (sorting - colors, shapes). The children were given the opportunity to utilize those concepts recently acquired and apply them to problem solving situations.

Infancy Curriculum

The intervention program for the Milwaukee Project provided the unique opportunity to begin education during infancy. During this period, we have attempted to maximize the potential for normal growth, thereby laying the foundations for further development. Our goal was the implementation of a program addressing itself to the support of growth in two main curriculum areas naturally developing during this time, perceptual-motor growth and cognitive-language development. Although presented separately, any activity planned for the infant would always include aspects of both areas.

Each teacher was responsible for organizing her infant's day into blocks of time planned for physical care activities and for

instructional activities. The daily schedule was left flexible so that activities could be planned in conjunction with the child's mood or activity level. Since, to an infant, learning is a continual process and not affected by this artificial separation of physical care and instruction, the time devoted to providing care has also been viewed and organized as a time for expanding experience. This is especially true in terms of verbal input, since the teachers always paired actions or events with words.

Perceptual-Motor Experiences

The development of the perceptual-motor system in infancy proceeds as a function of maturation and experience. A wide variety of systematic experiences can stimulate learning and possibly even influence the developmental landmarks. However, the goal was not to speed up the infant's maturation, rather to ensure that growth occurs by providing the infant with experience in practicing specific skills.

Perceptual ability enables the infant to receive, identify and interpret sensory impressions from his environment. The goal of the perceptual aspect of the curriculum is to provide sufficient varied experiences to enable the child to refine his perceptual acuity and to be able to discriminate between increasingly similar stimuli. The six perceptual areas are kinesthetic, auditory, visual, tactile, gustatory, and olfactory. In refining the ability to discriminate between stimuli the following variables should be manipulated.

1. Kinesthetic: Vary the child's direction and speed of motion. Vary his position in space. Vary the stress placed on different muscles.
2. Auditory: Vary the sounds presented in pitch, volume, location, duration, tone, rhythm. Pair sounds with objects, sounds with animals, words with objects.
3. Visual: Vary objects by size, color, shape, position, distance, movement, direction.
4. Tactile: Vary objects by texture, temperature, flexibility.
5. Gustatory: Vary flavors, temperature, consistency of foods.
6. Olfactory: Identify common smells.

Examples of perceptual discrimination activities are included in the appendix of math-problem solving activities (see Appendix VB).

As the child grows, his motor control is refined through maturation and practice. Motor control starts with the head, and then proceeds in a downward and outward direction, from head to toe and from the center of the body out to the fingertips. Each teacher was given a handbook of sequenced motor activities, which were to be adapted to

her infant. The handbook provided suggestions for promoting the development of head control, arm-hand control, leg-body control, whole-body control and visual pursuit.

If, for example, a teacher was interested in fostering the child's ability to follow a toy visually, she could refer to the handbook which offered the following activity suggestions:

Feeding: Sit child on your lap or in a high chair. Have his food to the right or left of you both. Click two articles together beside the food until he attends, then move them to the center of the table. Move them back and forth several times.

Bathing: Sit the baby in his bath. Tie one of his squeaky toys with a piece of string. Stand it on the side of the bath saying "Watch (boat sail, duckie swim)." Plunge it into the bath, and pull it slowly into the center of the bath. Squeak it again on the side, then pull it to the center, squeaking it at intervals.

Rocking: Sit the child on your lap in a comfortable position so that he can see the table top. Put a pull-along noisy toy on to the table, so that it is out of his line of vision. Pull it slowly so that he has plenty of time to attend to the end of the table. Do this two or three times then give the toy to the child to play with if he wishes to play.

When teachers referred to the handbook, it was for suggestions, since the teachers adapted the activities to their infants and varied the stimuli along the perceptual dimensions mentioned previously.

Cognitive-Language Development

Language Experiences

Too often infant and toddler programs neglect cognitive language training in favor of perceptual-motor activities. We feel that both are necessary and that the two groups of activities naturally complement each other. The development of perceptual-motor skills was viewed as a vehicle through which basic cognitive language experiences could be introduced. Throughout school years and beyond, nothing is as important as the ability to utilize language meaningfully. To be able to receive information, code and store it, then retrieve and utilize it.

An infant begins to develop receptive or listening skills as soon as he is born. He responds to loud noises that startle him, by crying. By eight weeks, he has accepted noise as part of the environment and begins to discriminate between sounds by attending to, stopping or changing an activity in response to the human voice. By four months, he attempts to localize sound and by six months he responds differentially to the sounds around him. As his listening skills develop, the child becomes aware of specialized sounds and the differences

between sounds. He begins to respond to his name and to simple directions accompanied by gestures. His receptive vocabulary grows as gestures and vocalizations are repeatedly paired with the same resulting action.

While the child's receptive skills are developing, so is the framework laid for his expressive use of language. At first the infant (3-6 mos.) begins to babble and to imitate sounds. By six to nine months he has begun to refine his vocalizations and to associate certain sounds with objects. To do this, he must be able to discriminate between objects, and associate the objects with sounds. His new skill is practiced through repeated pairings of the sound and the meaning while the stimulus is present. After a while, the infant learns the value of communication, when he produces the sound and receives the desired result (says mama - she comes). As both his receptive and expressive vocabularies grow, he continues to practice the words he has learned. By 18-24 months, the child has acquired a small vocabulary that he can use meaningfully.

Because language develops in relatively consistent stages, as with motor development, the child's level of maturation determined the activities chosen. Translated into curriculum programming, this meant that the teachers were given guidelines, specific goals, and frequent individual conferences to discuss the development of each infant.

Guidelines for Language Development. During infancy, a teacher can promote language development by being sensitive to the appropriate times for intervention. She learns when to label objects, when to listen, when to repeat the infant's utterances, expanding upon them, and replying to them. Helping the teacher prepare a climate conducive to language growth, the following guidelines were used:

1. Describe your actions to the infant during physical care (bathing, feeding) and perceptual-motor activities.
2. Label objects important to the infant (bottle).
3. Emphasize the pairing of specific words and actions (up - picking the child up).
4. Always respond enthusiastically to the child's utterances.
5. Minimize extraneous environmental noise.
6. Echo and refine the child's babbling.
7. When appropriate, expand the child's vocalization (ball; it is a red ball).
8. Do not only repeat and expand the child's vocalizations, but also respond to them so that he learns the communication aspect of language (ball; Will you throw the ball to me?).

Receptive Language Goals. As mentioned previously, comprehension skills progress in small sequenced steps from the newborn's reaction to a sudden loud noise to the 18 month old's ability to understand and follow directions. The goals listed below delineate the major stages involved in developing listening and comprehension skills during the infancy period.

To develop listening skills (the ability to attend to, recognize, and discriminate between various auditory stimuli):

1. To help the child to orient toward auditory stimuli.
2. To help the child attend to the human voice.
3. To aid in the recognition of familiar sounds.
4. To help the child discriminate and match sounds.
5. To help the child discriminate specific auditory stimuli against a background of extraneous sound.
6. To develop an awareness of differences in pitch and volume.
7. To foster attention to duration and sequence of sound.
8. To develop listening skills in relation to books.

To develop awareness that words convey meaning:

1. To elicit an appropriate response in conjunction with the presentation of familiar objects.
2. To increase receptive vocabulary by repeated pairings of objects and their labels.
3. To elicit a response contiguous with the presentation of familiar words.
4. To develop the ability to follow simple directions.
5. To develop auditory "memory."

To develop a receptive vocabulary:

1. To introduce the parts of the body.
2. To introduce the labels of objects in the environment.
3. To introduce number words and their sequence.
4. To introduce amount concepts (more, all gone, full, empty).
5. To introduce size concepts (big-little).
6. To introduce position concepts (up-down, on-off, open-shut, in-out, under-over).
7. To introduce shape concepts (circle, square).
8. To introduce color concepts.
9. To introduce time concepts (now, today, lunch time, nap time, time to go home).
10. To introduce the concept of "oneness and twoness."

Expressive Language Goals. As soon as the infant uses a word (mama) to represent something that is not present, and he achieves the desired result (she comes), he has begun to discover the communication aspect of language. Within the infancy period, the following goals for expressive language are appropriate:

To increase the expressive use of language:

1. To encourage the imitation of sounds.
2. To encourage spontaneous speech.
3. To encourage the imitation of syllables and words.
4. To encourage the pairing of words and gestures.
5. To develop a small meaningful vocabulary.
6. To develop the ability to express needs.
7. To develop the ability to participate in simple songs and finger plays.
8. To develop the ability to put two or more words together.

Cognitive Experiences

In infancy, the child's understanding of his surroundings is developed through physical interaction with his environment. His rapidly developing motor abilities, perceptual discriminations, and his limited, but constantly expanding, comprehension of language contribute to this growing understanding. Through this interaction with his environment, he determines that specific objects have names, classes of objects have names (toy, book), objects have certain properties (colors, size, texture, use, position), actions result in reactions from both people and objects. The extent or exact nature of the information a child draws from such experiences is unknown. However, we can assume that his attempts at understanding the environment are limited only by the availability of experiences themselves.

Cognitive development has been defined simultaneously as the amount of knowledge a child possesses within any given time interval and the techniques the child uses to acquire that knowledge. We assume that at this level, the amount of information a child possesses is directly related to the quality, quantity, and interrelations between experiences. Furthermore, through observation of infants it appears that much of the information they acquire is from active exploration and manipulation of the environment, and through trial and error problem solving strategies. The implications of these assumptions and observations were implemented in the following fashion.

1. A wide variety of manipulative problem solving toys were available and accessible within the environment. Numerous rattles, stacking toys, pans with fitted covers, graduated rings; noise making toys that shake, squeeze, and roll; wind-up toys, push toys, pull toys, riding toys; shape discrimination boxes, bowls, and mailboxes, simple puzzles were provided.
2. Teachers learned to view any situations, such as a ball rolling under a chair, as a potential problem solving experiences. In the above example, depending upon the size and type of chair, the child had the option of moving the chair, reaching between the rungs, lying on his stomach and reaching with his arm, using a stick, asking for help or getting another ball off the shelf in his attempt to obtain

the desired plaything. The teacher's role was to observe the child's attempts, give direction or help when "asked," and intervene before a child experienced frustration. Teachers also contrived problem solving situations as well as taking advantage of naturally occurring ones. Examples of these might be hiding a small plastic animal under one of three similar plastic cups, placing a milk bottle on the side of the table opposite to where a child is standing, or giving the child a small ball in a clear plastic bottle.

3. Naturally developing motor skills were used to expand the child's experiences. For example, once a child was able to grasp, hold and release objects, the teacher varied their size, shape, texture, weight, familiarity and even temperature. Since young children like to put one thing in another, containers were provided. The overall size, shape and size of the opening, and type of material (plastic, wood, rubber, thick glass) might be varied to provide experiences with weight, volume, opacity, and sound values. Once a child acquired simple locomotion skills, such as wiggling forward and backward, the toys and materials with which he came in contact were varied (noisemaking and silent, soft and hard, rolling and stable). Variations in color, weight, category (animals, blocks, balls) were also considered. The texture and color of the material with which his body comes in contact was another variable to consider: linoleum, hardwood, rugs (short and deep pile), plastic covered foam mats.
4. Since every activity is a learning experience, for the child, daily routine activities were viewed as potential learning situations. During bath time, for example, the following concepts and comparisons were presented: things that float and sink, things that disintegrate in water (cardboard, paper, soap) and remains intact, things that contain water, absorb water and do not contain water. Pictures and/or objects were hung on the wall inside the changing table about which simple stories about dressing, or articles of clothing could be told. By varying the display, children could point out familiar things or people in pictures and photographs, or feel the tactual differences of sponges, sandpaper, corrugated cardboard, sticky tape.
5. The environment itself was organized to introduce a variety of interrelated concepts. For example, the likelihood that a child will transfer a strategy used to solve one problem to other similar problems may be increased by providing materials similar in their solution. Stacking rings, shape discrimination material, pounding boards come in a variety of forms and can be used for this purpose. Open shelves and storage bins were organized according to specific variables (usage, color, similarity or sameness, category), in an attempt to help the child discover relationships between objects. The variables were changed periodically in accordance

with the interest and maturity of the child. Photographs and pictures were used as cues to the nature of specific materials stored in boxes as well as for cues on open shelving. Thus, in time, sorting, matching, categorizing, and drawing inferences became a part of the everyday environment.

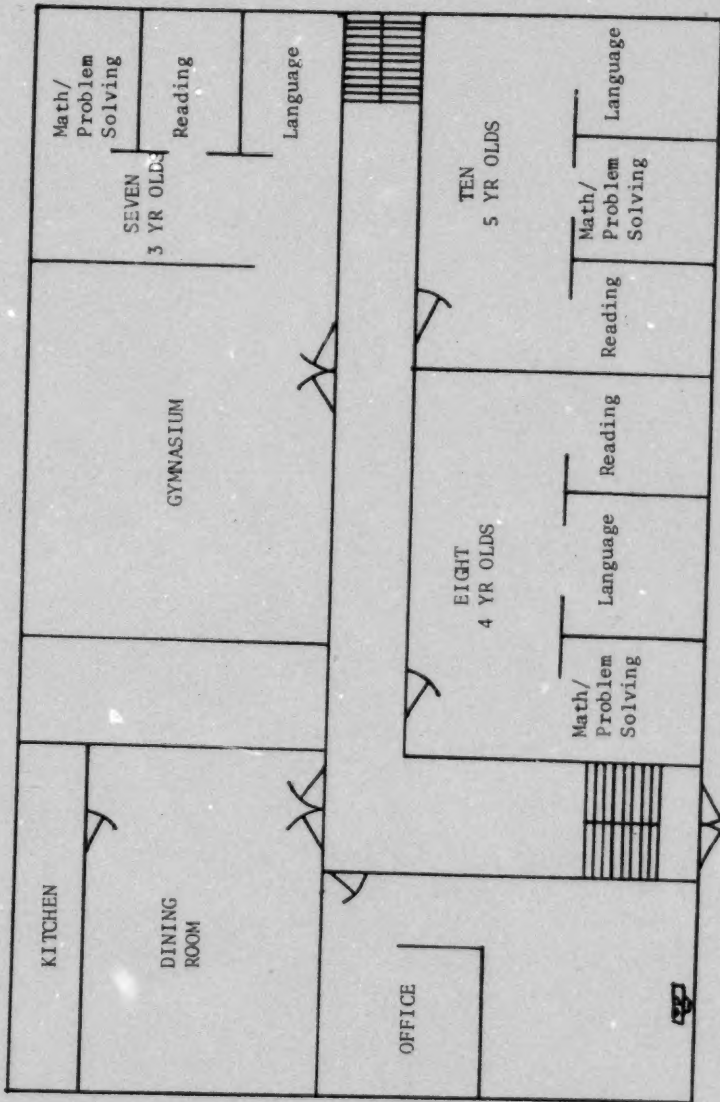
Preschool Program

Learning Environment

After the transition period, during which the same age children (six month age span) were grouped together in one classroom with three teachers, the children were eased into a more structured day which was divided into five or six learning periods (depending upon the age of the children) and three child-directed activity periods. Each classroom (see Figure 2-1) was divided into three learning centers (language, reading and math/problem solving). Within each learning center, there were one or two small tables which accommodated small group or individualized activities or both. Small rugs were also available. Open or closed shelves were used to store materials and to act as dividers. Each classroom also had an open area which was used for large group learning experiences and child-directed activity periods.

Although the three teachers equally shared the responsibilities for their group of children, each teacher was also responsible for one of the three learning areas. Each teacher, therefore, was trained as a specialist in either the language, reading or math/problem solving area. There were a number of benefits to this organization:

1. It enabled each teacher to concentrate on one area in depth.
2. It facilitated the programming of specific skills within one area.
3. It allowed each teacher to plan for individual children and for small groups.
4. It was possible to keep accurate records on each child's progress within each area.
5. Because of area overlap, the children were exposed to similar concepts presented through different teaching styles and materials.
6. It ensured that each child would have the opportunity to engage in a relationship with three primary adults with differing personalities.
7. It made it possible to match a teacher with a specific area on the basis of a) area preference, b) teaching style, and c) reaction of various curriculum materials.



1971 ROOM PLAN

Figure 2-1

8. It enabled the curriculum coordinator to prepare individual curriculum sheets for each teacher.

The organization of the learning environment can be characterized as structured in terms of the programming and evaluation of cognitive experiences, and in terms of the scheduling. These schedules were developed to help the child develop realistic expectations and time orientations. A sample schedule for the group of four year old children is listed below.

9:00-9:30	Breakfast
9:30-10:00	1st small group learning period
10:00-10:30	2nd small group learning period
10:30-11:00	Child-directed activity period
11:00-11:30	3rd small group learning period
11:30-12:00	Child-directed activity period
12:00-12:30	Lunch
12:30-1:45	Nap
1:45-2:00	Snack
2:00-2:30	4th small group learning period
2:30-3:00	5th small group learning period
3:00-3:30	6th small group learning period
3:30-4:00	Child-directed activity period

In the morning, in the three small group learning periods, the children rotated in groups of two, three, or four so that every child visited every teacher in her area (language, reading or math/problem solving). The experiences, presented in the learning centers, were teacher directed or teacher supervised-child directed. Tasks and experiences were designed so the children could work independently, with a peer, or in a group with the teacher, to solve problems.

The three small group learning periods in the afternoon did not necessarily take place in the learning centers. During that time, the children and teachers interacted in both small and large groups. Each afternoon the children participated in a language session during which activities from the Peabody Language Development Kit (Level #p or II) were presented. On a rotating basis, the child also participated in informal reading, science, music and art activities.

During the three child directed activity periods, each child was given the options of interacting with teachers or peers in his classroom, another classroom, in the gymnasium, or in the social play room. During the second child directed activity period, he also had the option of watching Sesame Street.

Scheduling is most effective when it can easily be changed. Change can be in the nature of a spontaneous decision to engage in a special activity -- like a visit to the zoo or to the park on the first day of spring. More importantly, change can take the form of a slowly evolving process sensitive to and directed by the changing needs of the children and the staff.

Free Flowing Room

One of the most important changes within the learning environment has been the addition of the free flowing room. Since 1972, there have been two main classroom areas (see Figure 2-2). The learning center room includes the three areas of language, reading and math/problem solving, and space for large group activities. The free flowing room (see Figure 2-3), which is large enough to accommodate all of the children at once, includes a block area (cars, garage, plastic animals), a housekeeping area (dressup clothes, large wooden house, dishes, dolls), a fine manipulative area (puzzles, games, go-together, pegboards), a science table (shells, magnets, rocks, magnifying glass, plants, prism), an art area (clay, crayons, scissors) with easels, and a reading area (library).

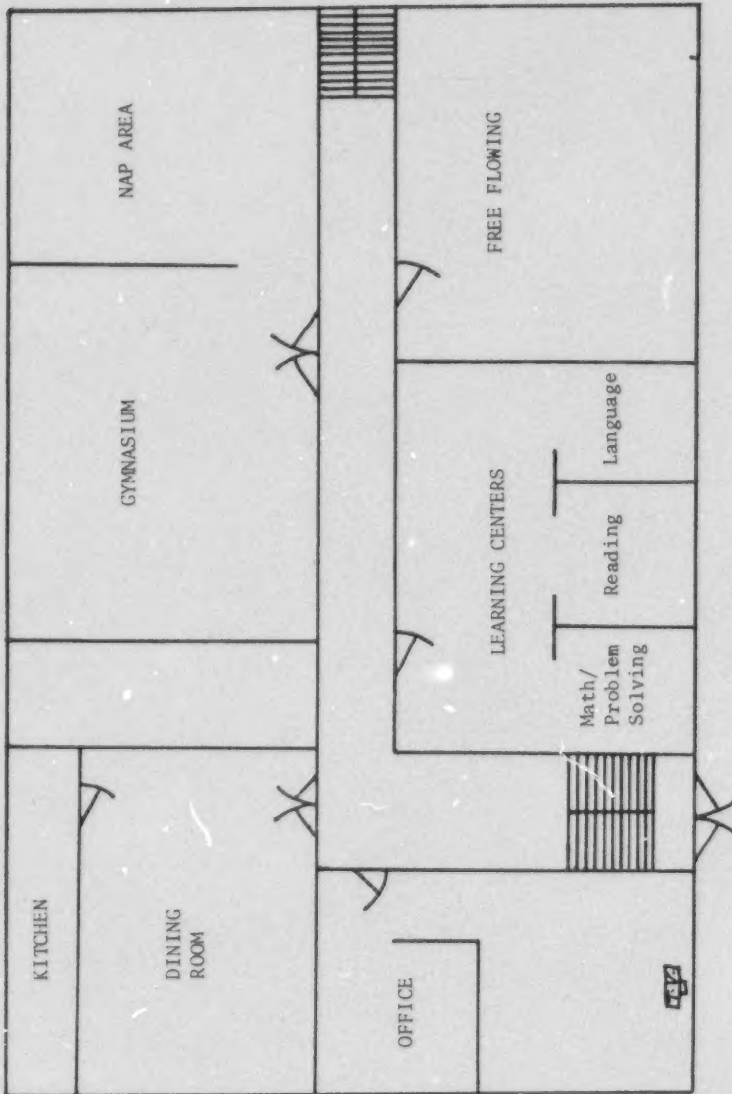
The teachers assigned to the free flowing room share responsibility for the art area, science area, fine motor area, and music activities. They are always available to listen, converse, or read. Games introduced in the small group learning areas, are placed in the free flowing room after a peer group of children understands their usage. Within the free flowing room, there is opportunity for peer interaction and activities involving vertical groupings of the children.

The free flowing room is child-directed. Each child chooses what activity he would like to do, for how long and in what way. The equipment is available for him to use as he wishes. Every morning, each child spends some time in the free flowing room, and some time in the math/problem solving and reading learning centers. In the afternoons, children spend some time in both the free flowing room and the language learning center.

We feel that the addition of the free flowing environment has created the needed balance of teacher-directed and child-directed activities, provided further opportunity for observation and evaluation of the children's ability to generalize concepts, and also has enabled us to increase the flexibility of the structure of the program to the benefit of each child while remaining oriented toward a cognitive-language curriculum.

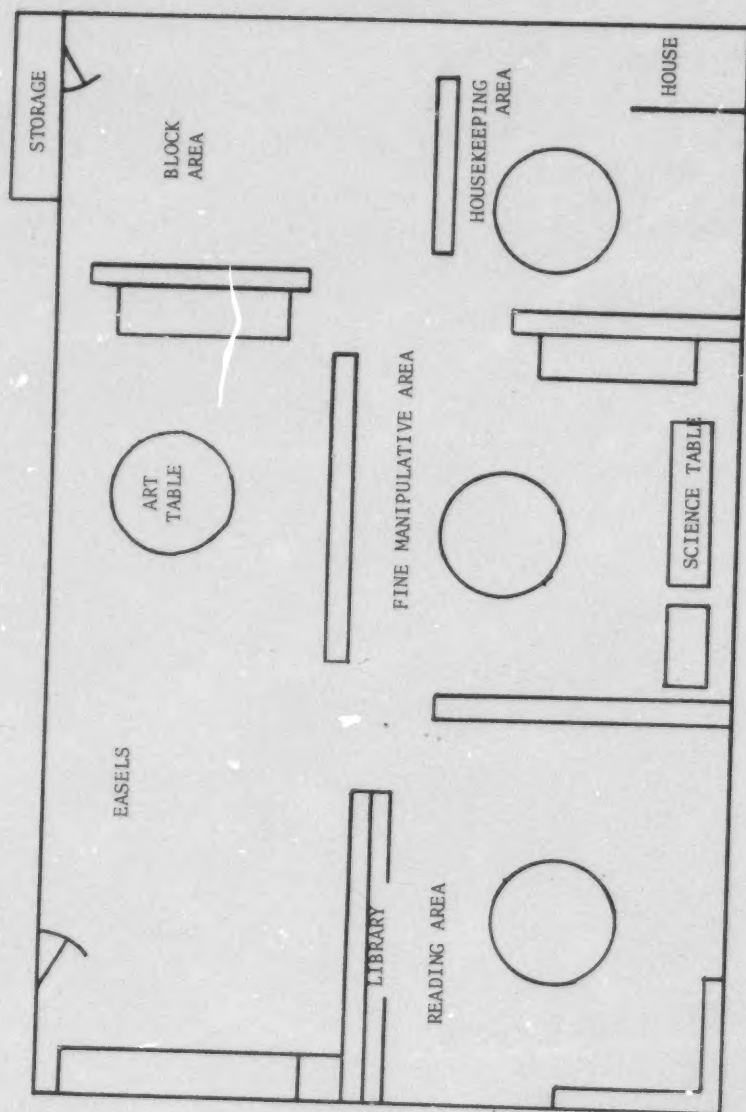
As one can see from Figure 2-4, in the morning while some children are in both the reading and math/problem solving area, the language teacher has no specific assignment. Her role in the morning is to provide individual help when needed or to expand concepts she has been introducing in her formal afternoon classes, as they come up naturally in the free flowing room. She also has the opportunity to evaluate the transfer of concepts through observation. In the afternoon, the math/problem solving and reading teachers are available for individual help or in the free flowing room.

The free flowing room also provides the children with the opportunity to use and expand concepts presented through direct teaching in the small learning groups. Of course, this opportunity was available before, the main difference being in terms of space. Previously,



1972 CLASSROOM AREAS

Figure 2-2



FREE FLOWING ROOM

Figure 2-3

LEARNING CENTERS

	Language	Reading	Math/Problem Solving	Free Flowing	Choice of Special Activity
9:30 - 10:00	▲	●	●	■	
10:00 - 10:30	▲	●	●	■	
10:30 - 10:45				■	
10:45 - 11:15	▲	●	●	■	
11:15 - 11:45	▲	●	●	■	11:30-12:00 Sesame Street
11:45 - 12:00	LUNCH NAP SNACK				
12:00 - 12:30					
12:30 - 1:45					
1:45 - 2:00					
2:00 - 2:30	●	▲	▲	■	Music
2:30 - 3:00	●	▲	▲	■	Music Story Reading
3:00 - 3:30	●	▲	▲	■	Story Reading
3:30 - 4:00				■	Gymnasium/Outside

The symbols indicate that at a particular time children are participating in:

- = a small group learning area
- = free flowing room
- ▲ = this subject area teacher is either helping children individually in her area or is available in the free flowing room to extend activities in her subject

DAILY SCHEDULE

Figure 2-4

equipment was placed out for child-directed activities, but had to be cleaned up after each period. Now the children have the opportunity to build constructions over a long period of time, to paint whenever they wish, to find new uses for old material. Because all the materials are within sight and reach, they are able to make more independent decisions.

In the past, the children were combined into small learning groups based on their general maturational level within each learning area. With the addition of the free flowing room, it was possible for a teacher to change or combine groups depending upon her lessons for the day. For example, the reading teacher might combine two groups for an alphabet bingo game, but have a smaller group size than usual for a phonics activity.

Learning Centers

Within the learning center, there were three learning areas: language, reading and math/problem solving. A discussion of the content and activities for each area are presented in Appendices III, IVA, IVB, VA, VB. The three areas are not discrete; in fact, they were planned to overlap, so that similar concepts were presented again and again in new ways. The teachers were given individual curriculum sheets, appropriate for their specific children. In this way, the curriculum was individualized for both children and teachers.

The evaluation of each child's progress is essential to curriculum planning. Through evaluation we can insure that each child is introduced to appropriate activities which will result in small step success learning. Evaluations by the teachers, the teacher supervisor and the curriculum coordinator were achieved on a formal and informal basis.

Every two weeks, the teachers prepared lesson plans listing the concepts and activities on which they were going to concentrate. They also filled in specific goals on concept evaluation sheets (Figure 2-5). At the end of the two weeks, each teacher would evaluate each child on the basis of the mini-goals, placing a check if the child understood and was able to do the activity. The evaluation sheets serve a dual purpose because they are a record of each individual's progress and are also a record of the types of activities that each teacher presented within a particular time period.

Informal direct observation of the children in the small group learning areas and in the free flowing room was conducted by the teacher supervisor, curriculum coordinator and teachers. Valuable information regarding the child's reaction to his teacher, peers and specific activities resulted.

Although our focus was on cognitive language experiences, the social-emotional experiences of the child were also of great importance. Through successful, pleasant learning experiences, reinforcing adults,

Date _____

LIST CONCEPTS TO BE EVALUATED

[illegible]

Figure 2-5

positive peer interactions, and opportunities for self expression, it was hoped that the child would develop a positive, confident self-image. By treating each child as an important person, one who has individual needs and rights, we attempted to insure that the children would grow respecting themselves and others.

Preschool Curriculum

Language Program

The preschool years are crucial ones for the acquisition of language. During these years the child develops from using words as labels in a one-to-one correspondence; to using one label to represent many objects, through the application of a classification process; to differentiating subtleties of meaning; to drawing conclusions from an array of particulars. As language develops, it is indistinguishable from the developing cognitive abilities as well as from general intelligence. By the time a child reaches school age he is expected to deal linguistically with the school experience. This means that a certain level of attainment in vocabulary, auditory attention, comprehension skills, and in thinking and reasoning skills are presumed.

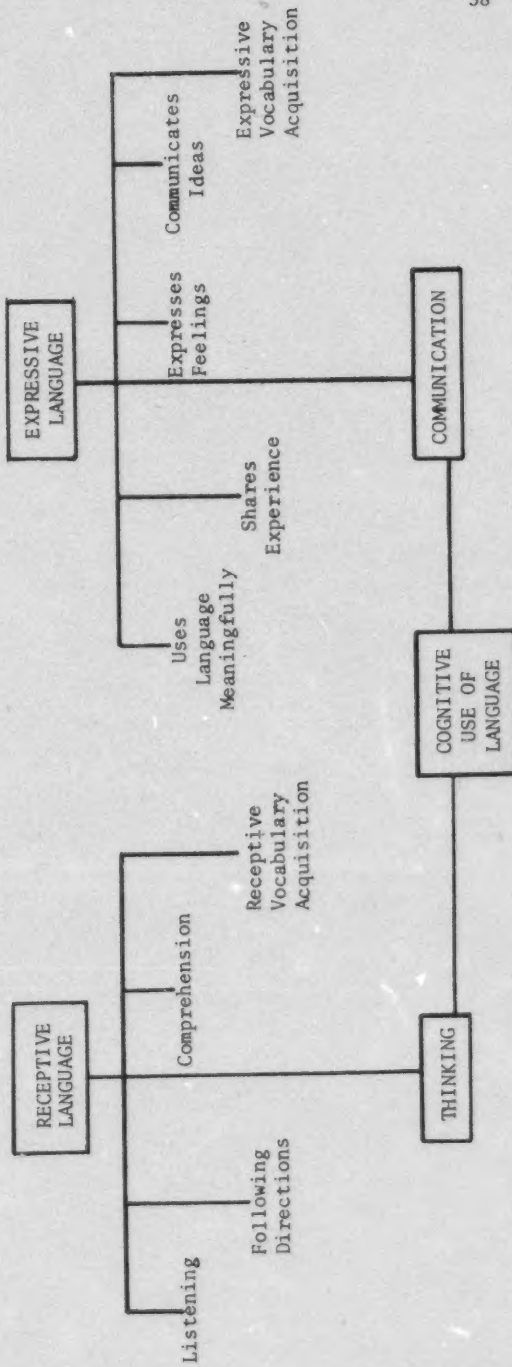
The language differences of "disadvantaged" children have been reported in the literature. Sentence length, vocabulary size, elaborative and descriptive language, auditory discrimination, verbal reasoning have been explored as areas of difference and of difficulty. Since facility with language is so closely related to school success and general intelligence, and because the preschool years are the most influential for the development of language skills, it was given major emphasis in the curriculum.

Language is considered one of the three main curriculum areas; it is allotted a distinct section within this curriculum text as is reading and math/problem solving. However, this is misleading, for the emphasis in language is not limited to a language learning session or a "talking time." The entire program with its high pupil-teacher ratio and flexible schedule is designed to foster both peer and teacher-child communication. In fact, such communication is given the highest priority and pervades all aspects of the program.

The specific language area of the curriculum is concerned with the development of receptive and expressive language skills and most importantly, the combination of these skills which enable children to think creatively and critically and to reason, i.e., the "cognitive use of language" (see Figure 2-6). For a more detailed discussion of the language program refer to Appendix III.

Reading Program

Reading has been described as a complex reasoning process which involves the ability to decode as well as obtain meaning from a printed



LANGUAGE SKILLS

Figure 2-6

page. The decoding process requires the discrimination and recognition of sounds and symbols, the association of symbols and sounds, the blending of sounds which, with the assistance of facility in language and the application of certain rules and clues, come to have meaning as words.

In order to derive meaning from words on a printed page, those words must be associated with referents, remembered, organized, interpreted within a grammatical framework and extended into thoughts. It becomes apparent that skill in reading is associated with perceptual-motor skills (especially in auditory and visual modalities), language skills, and reasoning ability. The entire Milwaukee project curriculum, with its division of academic areas of reading, language, and mathematics/problem solving, works toward the development of skills related to reading. However, the reading program places special emphasis on the development of those skills associated with the decoding process (see Figure 2-7). For a complete discussion of the reading program and related activities refer to Appendices IVA and IVB.

Math/Problem Solving Program²

In the problem solving area of the curriculum the child is presented with 1) an array of materials to manipulate and investigate and 2) questions and challenges. It is crucial that the child be an active participant rather than a passive observer in the learning situation and that he be encouraged to discover his own rules in working out solutions and correcting errors.

Although problem solving is obviously involved throughout the other areas of the curriculum, in this particular section it is intensively related to mathematical concepts. The concepts dealt with include the following:

1. Amount
2. Position
3. Size
4. Weight and Density
5. Contrasting or Opposing Conditions
6. Function
7. Color
8. Shape
9. Unit Knowledge
10. Number

These concepts were explored by activities which involved the processes outlined below.

PERCEPTION: kinesthetic discrimination
 auditory discrimination

²The Math/Problem Solving Program was developed by Rebecca Berning Lewis.

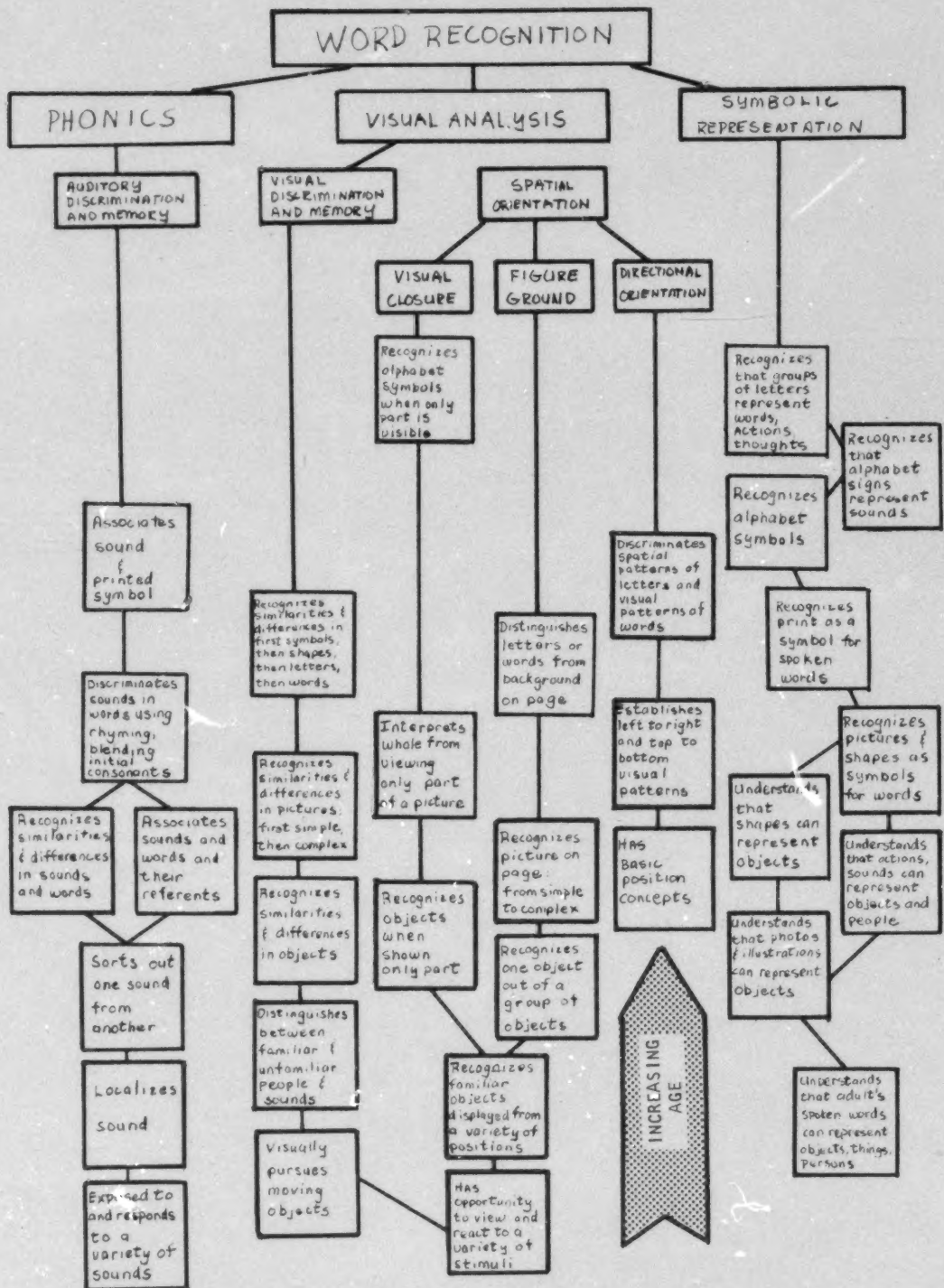


Figure 2-7

	visual discrimination
	tactile discrimination
	gustatory discrimination
	olfactory discrimination
EVALUATION:	comparison
	contrast
	matching
ORGANIZATION:	association
	classification
	correspondence
	seriation - time
	sequence (temporal)
	causality
	property (sensory)
	pattern (spatial)
REASONING:	analysis
	synthesis

The process of perception, the awareness of elements of the environment through sensation or the awareness of sensory stimuli, is discussed in the infancy section. Obviously both the lists of concepts and processes are somewhat arbitrary and overlapping and are, by no means, complete. However, to provide a conceptual model which gives an overview of possible experiences in small group learning situations, the processes and concepts can be coordinated as illustrated in the chart which follows (Figure 2-8).

By putting a process such as classification in conjunction with the concepts, it is evident that activities might include classification by number, shape, color, function, weight, size, and so forth. When a concept such as color is coordinated with processes, activities such as color matching, color association, classification by color, ordering by color shading or color patterns, color analysis (what is green, orange, purple, etc., made up of?), and color synthesis (mixing) are suggested. Not all combinations of process and concept may be applicable, but the chart form can be used as a hypothetical checklist in designing learning experiences. For a detailed description of the math/problem solving program and of math/problem solving activities refer to Appendices VA and VB.

This necessarily brief description of the infant intervention does not specify the precise activity for every moment for every day to the age of six for each experimental subject. To do so would be, of course, an impossible task. These descriptions are intended to convey the philosophy and principles which guided the intervention program.

PROCESSES		QUANTITY	POSITION	SIZE	WEIGHT	CONTRASTING CONDITIONS	FUNCTION	COLOR	SHAPE	GENERAL KNOWLEDGE	NUMBER
PERCEPTION	kinesthetic discrimination										
	auditory discrimination										
	visual discrimination										
	tactile discrimination										
	olfactory discrimination										
	gustatory discrimination										
EVALUATION	comparison										
	contrast										
	matching										
ORGANIZATION	association										
	classification										
	correspondence										
	seriation-time:sequence										
	causality										
	property										
	pattern										
REASONING	analysis										
	synthesis										

Fig. 2.8 Math Problems Solving Program Conceptual Model

CHAPTER III

ASSESSMENT OF BEHAVIORAL DEVELOPMENT

The unique nature of the Milwaukee Project, in contrast to previous longitudinal studies, is reflected in the research design. Generally, previous longitudinal studies have been either 1) descriptive, e.g., Fels and Berkeley Growth Studies; or 2) treatment oriented, e.g. Klaus and Grey, Weikart. The longitudinal studies in the first category were thorough descriptions, producing a large amount of correlational data, but were without a particular focus perhaps because the population was not carefully selected according to set criteria. By considering a large number of variables simultaneously, this research was essential in establishing grounds and guidelines for later work.

The second group of studies, often not strictly longitudinal, for their onset was not at the child's birth, studied selected groups of children for several years and often followed them up later. These studies have come under severe criticism because of their lack of adequate control. The major selection criteria were low income of the families and age of the child, maternal intelligence and a host of other variables (Tulkin, 1972) were not considered. Clearly the focus of this second group of studies was remedial, not preventative. Often the treatment was short-term both in hours per day and in total duration. Specific program goals were sometimes lacking.

While the previous longitudinal research has provided segmental evidence of the importance of early development it has never clearly coordinated the selection and the longitudinal aspects in such a way as to clearly evaluate development of a particular group of children as a function of a prescribed treatment.

The Milwaukee Project originally specified and controlled the dimensions of the population. The children were born to low income mothers with IQ's below 75; they exhibited no organic damage. Therefore, the research operated from the null hypothesis of no difference between Experimental and Control groups. Second, longitudinal treatment in the form of intensive educational stimulation was instituted and evaluated. In addition to the abundant comparative data between the groups, the project provides descriptive developmental data in the areas of IQ, learning, language and social and personality development. The data reflects not only differential patterns but also continuity of development and a framework within which future cross-sectional studies can be viewed.

Taken together the preventative, longitudinal and selection dimensions enable conclusions not possible in previous work. In addition the research focused around particular aspects of development typically associated with cultural-familial mental retardation.

Just as the curriculum composing the treatment was not committed

to any one theory, the research design was eclectic. The two major goals were (1) to evaluate the effects of altered experience upon the intellectual and social development of the Experimental group in comparison to the Control group and (2) to study development as a continuous process through a variety of measures. Our particular concern was with the child's increasing awareness and organization of his environment. Our evaluations centered around his cognitive and social development in terms of his ability to process information effectively to interact adequately with his environment.

The specific measures that were selected were within four research areas. First were standardized measures of intelligence (i.e. IQ), traditionally used to measure change in preschoolers and the measure used in maternal selection. Second was a series of learning measures designed to evaluate patterns and strategies utilized by the children in discrete learning situations. Third were language measures to evaluate comprehension and production ability with the rationale that language skills serve as a major interface between the child and the environment. Fourth, social and personality measures were used to study the child in interaction and evaluate his response styles. In addition measurements of physical growth were routinely collected.

In the first twenty-four months of life, the measurement schedule was largely restricted to general developmental scales and emerging vocalization and language. Beginning at 24 months increasing emphasis has been given to experimental, direct measures of learning and performance. For the most part, particular measures were scheduled for administration at specific age levels (that is, as opposed to a task being administered to all subjects at a given point in time). The disadvantages of this procedure are, of course, that we must wait for all or most subjects to move through a particular age level before the n's are of sufficient size to permit evaluation. In all cases, any given measure was administered to both Experimental and Control subjects by the same tester: testers were not involved in any component of the intervention program.

Attrition

One of the major hazards of a longitudinal study of this kind is the potential hazard of a substantial degree of attrition. We feel fortunate in having been able to minimize this figure. Up to the present time two Control families have been lost and all efforts to locate them have failed.¹

The Experimental group lost two subjects very early; one infant died as a result of a sudden crib death, and the second was lost by withdrawal of the mother from the program. This latter case represented the only instance of refusal to participate in the intervention program. Since both these losses occurred while the samples were still being accumulated, they were replaced, bringing the total

¹Apparently, some of these families, when changing housing, make every effort to leave no follow-up address in order to avoid bill collectors, etc.

N to 20; however, more recently three Experimental families have been lost due to relocation to southern states. In two of these cases, the families left after the children had reached four years of age, and in the third case, after the child was 4-1/2. Contact has been maintained with these three families however, and the children will receive the same comprehensive evaluations at age 7 scheduled for all subjects. In addition, subsequent to accumulation of the basic samples, additional infants born to Experimental mothers were also introduced to the intervention program and there are five such younger siblings. Intelligence test data on these siblings is reported separately from basic samples.

Physical Development

The nutrition and medical services provided the Experimental children were incomparably different than those for Controls. Experimental children were given lunch at the Infant Education Center and were referred for medical and dental care when problems were identified by staff at the Infant Education Center. In addition, the Experimental mothers were instructed in nutrition and general health care. As a consequence, it is entirely possible, and even likely, that the general health and physical well being of the Experimental children were superior to that of Controls. As a consequence, any differences in the developmental status of the two groups could conceivably be a function of this factor rather than the modification of the experiential environment. In order to permit us to make a tentative evaluation of the probable effect of the physical factor, we have procured medical evaluations and other basic physical data such as height and weight.

Medical evaluations have been carried out independently by staff of the Children's Hospital and Marquette Dental School. The analysis of these data revealed no statistically significant differences between groups in height, weight, serum lead levels, or other blood analyses.

In addition, the project measurement staff, as well, has been collecting height and weight data.* Unfortunately, we did not schedule collection of height-weight data until our study had been in progress for some time, and, as a consequence, we do not have complete data at the earliest age levels. Table 3.1 indicates mean height and weight data for Experimental and Control subjects. The data at 24 months is

*Head circumference measurements which appeared in a previous report have been omitted because of the low N measured and the inaccuracy of measurement.

²The 1971 Progress Report included, in an Appendix, a figure presenting height data, but unfortunately failed to specify the n's involved at each age level. One critic reviewing these data in the Appendix assumed that the point on the graph at 24 months was based on the total sample and apparently made statistical projections on that basis, concluding that the Experimental and Control groups were significantly different at 24 months. In actual fact, as can be seen in Table 3.1 (ff.p.) the n's for which we had data at 24 months were two and five respectively for the two groups and, of course, provide no basis for meaningful statistical comparison.

Table 3.1

Mean height and weight of Experimental and Control groups
sampled since two years of age.

	CA	N	Ht.	SD	Wt.	SD
EXPERIMENTAL	24	2	33.0	1.00	30.5	1.50
	30	10	35.6	1.92	32.6	3.83
	36	18	38.0	1.74	35.5	5.18
	42	20	39.4	1.86	37.6	5.22
	48	19	41.1	2.86	40.3	5.37
	54	18	42.3	2.73	42.9	7.06
	60	17	43.3	2.68	46.2	8.21
	66	15	44.6	2.52	49.4	10.29
CONTROL	24	5	35.2	2.55	34.0	3.21
	30	15	36.9	1.62	33.6	3.27
	36	17	38.6	1.45	35.3	3.77
	42	18	39.5	1.41	37.7	3.58
	48	18	41.0	1.50	39.4	4.25
	54	18	42.4	1.45	42.8	4.89
	60	18	43.7	1.63	45.1	5.03
	66	13	44.7	1.84	46.3	6.23

incomplete because collection of height-weight data and other physical measures was not originally scheduled as part of the measurement schedule, but was included later. Statistical analyses of height-weight data at all subsequent age levels where the n's are more nearly complete produce no significant differences between groups. One index of the comparability in terms of physical status of the two groups at birth is provided through hospital and birth records. Table 3.2 provides mean height and weight data as recorded on subject's birth records. Again, the differences between groups are non-significant. In addition, the incidence of recorded abnormal conditions at birth (including such things as premature delivery, use of forceps and Caesarian delivery) are comparable for both groups.

Table 3.2

Mean height and weight
of the Experimental and Control
groups at birth.

	EXPERIMENTAL N=20	CONTROL N=18
Height	19.4 in. (SD=1.2)	19.8 in. (SD=1.9)
Weight	6 lb. 15 oz. (SD=.94)	7 lb. 2 oz. (SD=1.1)

Standardized Measures of Intelligence

Standardized measures of intelligence have been the traditional method of comparison between groups. The expected intellectual development for the Control group, predicted from survey information of mean Cattell and Binet IQ scores for a group of children whose mothers had (WAIS) IQ's below 75, is shown in Figure 3.3 (see page 50). As seen in Figure 3.3, there is a decline in mean IQ from 92.5 at 24 months to 66.4 for children of 14 years or greater. This latter figure rather remarkably approximates the mean maternal IQ of 68, and supports the value of maternal IQ as a better predictor of a child's IQ at 18 than is the child's own IQ at age two. It can be noted that the mean IQ at 24 and 36 months is well within the average range, and that the major decline occurs between 36 and 60 months.

The Gesell Developmental Schedule was administered to Experimental and Control infants at the ages of 6, 10, 14, 18 and 22 months. These data are summarized in Table 3.3 and Figure 3.1.

Table 3.3

Mean Gesell Developmental Schedule Scores

Months	6	10	14	18	22
<u>EXPERIMENTAL</u>					
Motor	7.4	12.0	17.0	22.5	28.0
Adaptive	6.7	11.9	17.0	21.5	26.2
Language	7.2	10.4	15.8	19.9	26.2
P-Social	7.2	11.8	18.9	20.9	27.3
<u>CONTROL</u>					
Motor	5.4	12.6	15.2	18.1	22.6
Adaptive	5.7	11.2	15.0	17.5	20.8
Language	6.1	10.0	14.9	16.7	20.1
P-Social	5.9	11.3	16.4	20.1	22.7

The data in Table 3.3 are the mean developmental age scores for each age level tested. It can be seen that on all four Gesell scales (motor, adaptive, personal-social and language) the performance of both groups appears comparable at 6, 10 and 14 months.

At 18 months, however, the Control groups falls 3-4 months below the Experimental group on three of the four Gesell scales, although still performing at or close to Gesell norms. At 22 months, however,

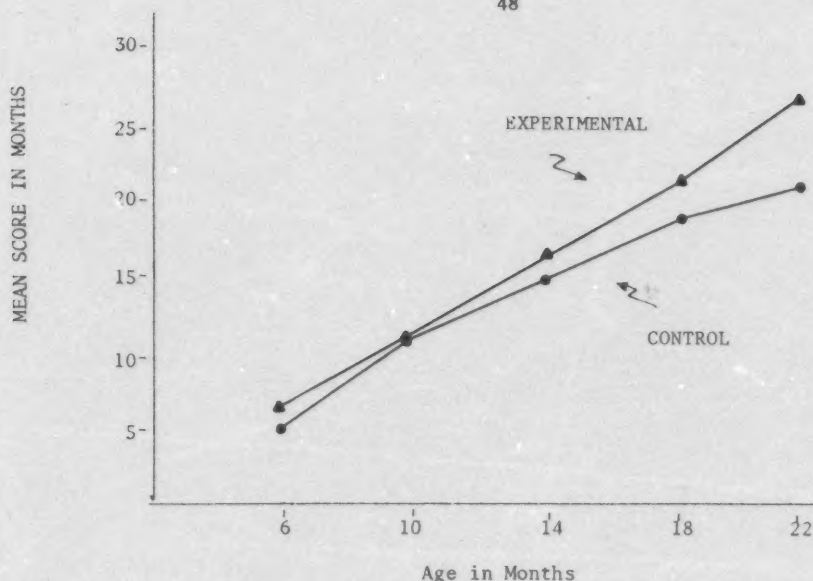


Fig. 3.1 Composite of 4 Gesell Scores

the Experimental group scores from 4.6 to 6.1 mos. in advance of the Control group with the Controls falling below Gesell norms on the Adaptive (minus 1.2 mos.) and language (minus 1.9 mos.) scales. These data are presented in Table 3.4. The calculation of a deviation score facilitates comparison of the growth discrepancy in months from the Gesell norm and between groups. A summary of the schedules in the form, the mean deviation score is plotted in Fig. 3.2

Table 3.4

Mean Developmental Deviation Scores in Months from Average Growth Line					
Months	6	10	14	18	22
<u>EXPERIMENTAL</u>					
Motor	+1.4	+2.0	+3.0	+4.5	+6.0
Adaptive	+ .7	+1.9	+3.0	+3.5	+4.2
Language	+1.2	+ .4	+1.8	+1.9	+4.2
P-Social	+1.2	+1.8	+4.9	+2.9	+5.3
<u>CONTROL</u>					
Motor	- .6	+2.6	+1.2	+ .1	+ .6
Adaptive	- .3	+1.2	+1.0	- .5	-1.2
Language	+ .1	0	+ .9	-1.3	-1.9
P-Social	- .1	+1.3	+2.4	+2.1	+ .7

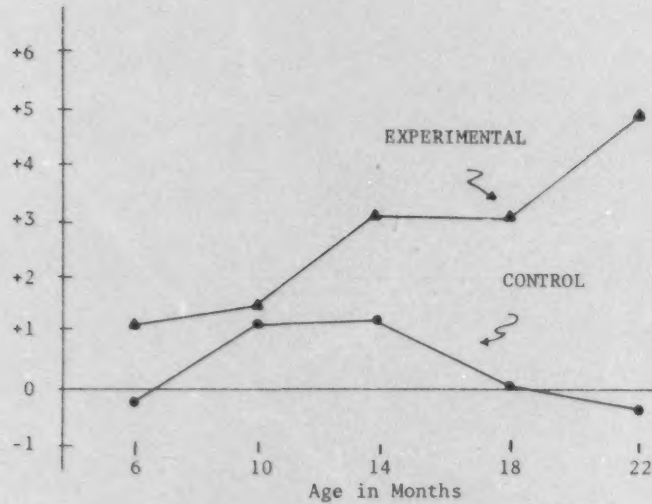


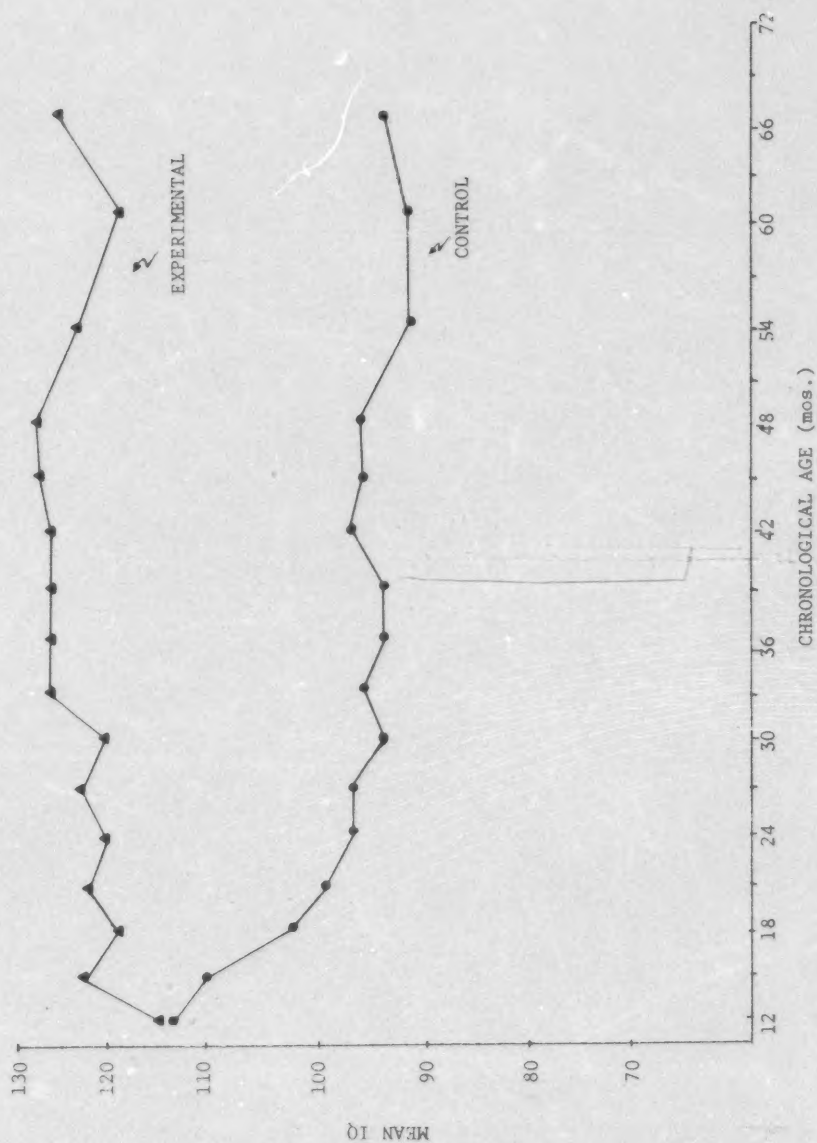
Fig. 3.2 Composite of Mean deviation from Growth Norm

To summarize, Gesell data is roughly comparable for both groups to 14 months with performance on all scales slightly in advance of test norms. At 22 months, performance of the Experimental group is clearly accelerated while the Control group performs at or slightly below norms for the four scales.

Measured Intelligence to 66 Months

The standardized tests of intelligence included the Cattell, Stanford-Binet and the WPPSI. The Cattell test, extending into the Binet, was scheduled at three month intervals beginning at CA 24 months and at six month intervals from CA 48 months on. We have illustrated the course of intellectual development for the two groups from 12 months until 66 months of age in Figure 3.18 (page 49a). The data presented uses scores derived from the Gesell schedules from 12-21 months, and Cattell and Binet scores from 24 to 66 months. The mean IQ at the 60 month age level is based on 17 of the children from the original 20 Experimental families (missing are 3 children who have only recently moved) and 18 of the original 20 Control families (2 have been lost to us since shortly after the program began), while 2 Experimentals and 5 Controls have not yet reached the 66 month age. The Experimental group

Fig. 3.18 Mean IQ Performance with Increasing Age For the Experimental and Control Groups



at 60 months, had a mean IQ of 118 (s.d. = 6.3) compared to the Control group's mean IQ of 92 (s.d. = 12.5): a difference of 26 points. The mean IQ of the Experimental group at 66 months is 124 (s.d. = 8.6), compared to the Control group's mean IQ of 94 (s.d. = 10.7): a difference of thirty points. The mean IQ for the Experimental group based on the means at each age interval, from 24 to 66 months is 124. The discrepancy between Experimental and Control group performance at each three month test interval varies from a minimum of 25 IQ points at 24 months to 30 IQ points at 66 months. The WPPSI has been administered at 6 month's intervals beginning at 51 months. The Experimentals show a mean IQ of 114, 111 and 110 at the 51, 57 and 63 month testings. In contrast, the Control group WPPSI scores are 20 or more points discrepant: 85, 81 and 88 for each of these three points. At 63 months not all Experimentals or Controls have been tested. However, of those Controls tested, only three have ever scored over 100 of the WPPSI and they are included, while the remainder are below 91. On the other hand, not one Experimental child has scored as yet below 100.

In summary, the performance to date, on standardized tests of measured intelligence indicates a remarkable acceleration of intellectual development on the part of Experimental subjects who have been exposed to the infant stimulation program. Further, their performance is quite homogeneous as contrasted with that of the Control group where only about one-fourth of the Ss test at or above test norms, with the remainder trending toward subaverage performance. In order to evaluate the effects of the examiner in the production of group differences in test performance, one test administration was conducted by a qualified examiner brought from a neighboring state for this purpose. All subjects were tested in an environment totally unfamiliar to them and the examiner was not apprised of the subject's group membership. At that time, all four year scores were complete and comparison of these scores with the independent tester showed no significant difference. These data are summarized in Table 3.5.

Table 3.5

Comparison of Project Examiner and Independent
Examiner IQ Test Scores

	Project	Independent
EXPERIMENTAL	126 (S.D. = 5.5)	127 (S.D. = 9.5)
CONTROL	95.7 (S.D. = 10.8)	92.1 (S.D. = 12.6)

Of the original 20 Experimental families, five subsequently born siblings were entered into the educational program. These children are, in effect, the youngest children in the program. Table 3.6 compares the mean IQs of the siblings at identical ages and illustrates the consistency in their performance.

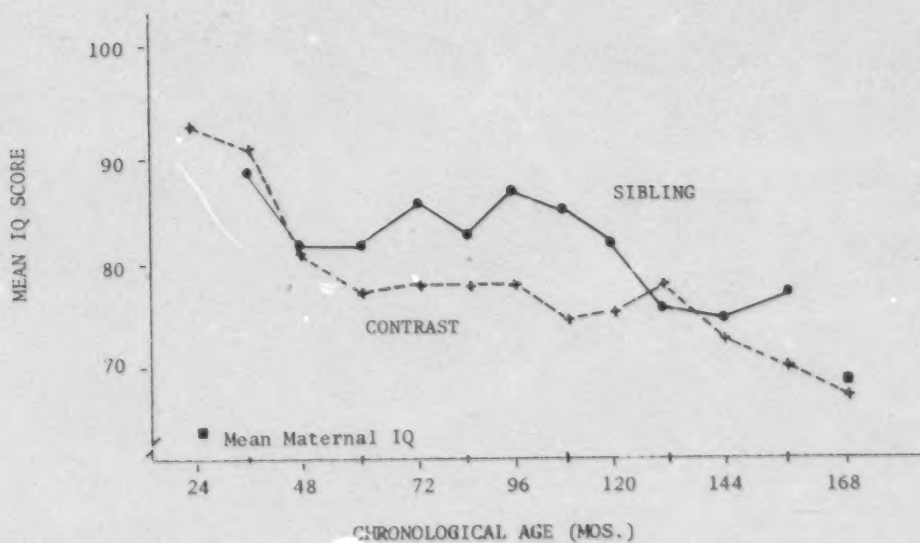
Table 3.6

Comparison of Mean IQs of Older and Younger Siblings
Both in the Experimental Group

Age in Months	24	30	36	42	48
Older Siblings	117	116	120	122	124
Younger Siblings	112	119	122	123	127

Figure 3.3 illustrates the mean IQ of older siblings of E and C subjects in comparison to the Contrast group means derived from the original survey data referred to previously. In general, these older siblings of our actual subjects show the trend toward declining IQs with increasing age characteristic of the Contrast group.

Fig. 3.3 Sibling and Contrast Group IQ Scores



Separating out those older siblings who were between 36 and 66 months in age at time of testing, we find that the mean IQ for the Experience siblings was 79 and the mean IQ for the Control siblings was 77 (N=17). Actually, Control siblings show a comparable mean IQ of 83, i.e. compared to 77 for their siblings at the same age. However, Experimental subjects have a mean IQ of 118, 39 points higher than their older siblings at the same age (i.e., 79). As seen in Table 3.6 above where siblings are participating in the Experimental program, there is no such discrepancy.

Introduction to Experimental Measures of Behavioral Development

In the following sections we report the results from the three areas of the experimental assessment program:³ 1) learning-performance measures; 2) social-personality development, and 3) language development. The development of these three aspects of our assessment program was based on a common rationale. We wanted to know how a child went about responding to his world, and in what areas of responding was he most or least facile. In the various tasks used, we asked questions about the manner of a child's responding -- rather than simply whether or not he responded. The use of tasks that merely give frequency counts do not really tell us about the nature of behavior, and are even further reduced in information when submitted to statistical analyses. Secondly, we were quite concerned with the personal development of our children because of the considerable information about the detrimental effects of the mother-child interaction upon such children; particularly so, in light of the stultifying effects such interaction has for cognitive behavior. Our language program also reflects our attempts to develop a comprehensive picture of early language development -- the data for which are unique in that they are extensive and longitudinally derived. Several new instruments were researched and have already proven their sensitivity in assessing differential early language development.

³ Over the past five years certain areas of work have been the prime responsibility of several different people. The overall assessment program has been the responsibility of Howard L. Garber. The social-personality research has been the responsibility of Carol A. Falender. The Language research program was begun by Richard Dever, and then guided successively by Carol Cellman, Mark Thelen, Barbara Davis, with help from Elena Reyes, Lindsay Holichuk and Pat Haeger. There are of course many others to whom the project is indebted for their contribution, especially Jim Perkins who has helped in the compilation and analysis of the data.

Learning and Performances

The learning research program was designed to assess the learning-performance characteristics of young children longitudinally, and to determine the role of these characteristics in the learning process. Furthermore, the task of this aspect of the assessment program was to provide information about cognitive growth that would make more comprehensive the knowledge about intellectual development we were deriving from the IQ tests and various language measures. Obviously, the exceedingly complex nature of cognitive growth requires more than a single measure of intellectual development, such as is obtained from IQ tests. Thus, to obtain a more comprehensive picture of the growth of cognitive abilities, we planned an array of experimental learning tasks.

In earlier reports our procedure for assigning children to either young or old Experimental or Control groups allowed us to present and discuss data that would otherwise have had to wait some time until all children had arrived at the same age level. Within each group there remains the age discrepancy, which results in incomplete testings (i.e., data point frequencies are incomplete at the upper age levels), but we have now minimized this discrepancy. In this year's report, the manner of cumulating data has been to more appropriately represent the differential development between groups through the third, fourth, fifth, and sixth years of life.

Although the highest chronological age data point of 66 months has been reached by nearly all the children, we have remained cautious in discussing the data in all but a general fashion. We continue to maintain a conservative attitude in the interpretation of the results. Even though the differential performance noted earlier, has, for the most part, continued in favor of the Experimental group, whatever implications this trend holds for subsequent performance levels still can only be presumed for two reasons: 1) the nature of the children and the developmental levels through which they are proceeding and 2) the nature of the instruments employed for assessing children at such ages.

We were concerned with delineating some of the characteristics of early learning behavior that either facilitate or interfere with performance. We wanted information on the response patterns or behavior style, as well as the role of attention in early learning. These tasks, therefore, not only provided a measure of the differential development of the learning process in the children, but also increased our understanding of how certain performance variables relate to cognitive growth.

Stevenson and Wright (1968) have reviewed the major learning phenomena of the young child, with particular attention to what is termed response biases. These include, e.g., dimensional preferences such as color vs. form, or certain response styles or strategies. There are two vital concerns regarding such behavior in the young child. On one hand, performance may either be facilitated or interfered with, as a function

of the design of an experimental task, if the particular response biases of the subject are either task relevant or irrelevant (e.g., Suchman and Trabasso, 1966). On the other hand, such response biases are generally accepted as being age appropriate at certain developmental levels, but are expected either to be controlled or 'dropped out' with increasing age. This latter phenomenon, which we shall call a developmentally related shift in response tendencies, has been found to be slowed in low SES children (e.g., Bresnahan, 1966; Horowitz, 1967; Osler and Kofsky, 1967) and mentally retarded children (Corah, 1968). With these considerations in mind, the series of tasks employed were designed to evaluate developmentally related response tendencies as well as the differential development of the learning process. It is important to note that the assessment of the children's behaviors is essential to the determination of the effectiveness of the "infant stimulation" program in preventing specific behavior deficits.

There have been a wide variety of scheduled measures, including: color-form matching, sorting probability, discrimination, an Ivanov-Smolensky discrimination procedure, an oddity discrimination, etc. Some of these tasks were repeated over the years, but, until now, the analysis of performance on these tasks had to be reported in a preliminary fashion. Now a majority of the children have completed the replications.

Color-Form Matching Task: Some of the developmental changes in preference for form and color depend on developmentally related changes in the attentional processes, which, for example, Luria's work (1963, 1967) on the orienting response (OR) has shown to be a function of the level of cognitive development. Bruner's work (Bruner and Mackworth, 1966) on how children regulate selection of visual information relied on assessment by eye fixation behavior. He demonstrates that varying amounts of attention are needed as a function of the stimulus configuration, and that attention to various aspects of a stimulus configuration changes qualitatively with changes in developmental level. Corah (1964, 1966) suggests that the mechanism responsible for changes in stimulus preferences is a developmental attentional process which operates in a manner similar to the process Piaget has conceptually termed centration and decentration. In other words, the young child's preference for color is not so much an inability to discriminate forms; rather the child's perception is centered on the dominant characteristics of a stimulus configuration (in this case, color) at the expense of the other characteristics of a configuration. In the older child, perception and judgment become decentered and attention is fixed on all of the characteristics of a configuration.

Our experimental task has been concerned with the development of the differential appreciation of the stimulus characteristics (or dimensions) of color and form. Brian and Goodenough (1929) found that children between the ages of 3 and 6 years used color as a basis for matching stimuli more often than did older children (i.e., over 6 years of age), while adults matched primarily on the basis of form. This

finding has been replicated a number of times, with a general developmental shift from color to form preference occurring around five years of age. Kidd and Rivoire (1966) report that very young children often show a preference for form, then switch to color, and eventually back to form. Such research has not really established the role of color-form preferences in early learning. However, what would appear to be most important in very young children is a preference which is consistent, irrespective of the dimension.

In normal children it has generally been found that the younger child initially shows a greater tendency to match on the basis of color, but with increasing age there is a gradual shift to form (at approximately 4 1/2 years). Although color and form preferences have been studied in children as a function of age, little is known about the role of these variables in the learning process at different levels of cognitive development (i.e., as a function of intelligence). However, there is evidence (Engel, 1935; Corah, Jones and Miller, 1966; Kagan and Kemkin, 1961) indicating a relationship between intelligence and preference for form in varied stimulus situations. Furthermore, not only do form-preferring children have higher mental test scores, but they are also more accurate in classifying stimuli along dimensions other than form. This shift in preference from color to form has been found to accompany the development of verbal mediation abilities.

Specifically, our color-form matching task was concerned with the development of the child's attention to color and form and the response strategy he employed. The child could respond consistently only if he attended to one dimension or the other. He could not respond consistently if he used a response strategy such as position response, or response alternation. As was noted, responding to the dimension of either color or form is more developmentally advanced than ignoring the color or form dimension and responding, e.g., to position. This test has been administered four times, beginning in the third year of life (mean age of subjects was 2 1/2).

The stimulus material consisted of colored geometric forms (square, circle, and triangle; red, green, yellow, and blue). On each trial, three stimulus cards were displayed to the child. The child was then asked to match one of two stimuli to a third, which was the standard. One of these matched the standard in color and the other matched it in form. Order of presentation was randomized (Fellows, 1967), so that a form or color response could not be correct by position preference or alternation response alone. A preference for a dimension was indicated when two thirds percent or more of the S's responses were consistently toward one dimension or the other.

Our first concern in the analysis of this data was whether the expected course of preference occurred -- i.e., an initial preference for color with a shift to a preference for form. Over all testings, the Experimental group shows a predominant preference for form as compared to color. On the other hand, the Control group's tendency is to prefer

color. At the 2 1/2 year mark, both groups are comparable, being about equal in their preference for color and form. However, the Control increases its preference for color while the Experimental group increases its preference for form. The performance of the Experimental group can be seen, in Figure 3.4, to approximate the expected developmental course for dimensional preference. Moreover, the lack of larger differences between the Experimental and Control groups may be attributed to the larger number of perseverators in the Control group. This response behavior results in an even number of responses along both dimensions, and thereby dissipates somewhat the differential response behavior to color and form between groups. In other words, the effect is to mask the performance difference between groups, which is indicated by the larger number of dimensional preferers in the E group. A preferer was any child who gave two thirds or more responses to either the color or form dimensions, while a perseverator gave two thirds or more responses to a position.

In Figure 3.5 we have illustrated the percentage of preferers in each group. Perhaps more important than demonstrating a preference for either form or color, is the demonstration of a unidimensional preference, particularly at these early ages. In Figure 3.5 it can be seen that in the third year of life, none of the Controls demonstrated a unidimensional preference (i.e., in terms of color or form). By contrast, over half the Experimental group (55%) showed unidimensional responding. In the fourth year of life and during the fifth and sixth years as well, this differential performance was maintained. Thus, there are three notable points: 1) 3/4 or more of the Experimental group showed unidimensional responding at each successive testing, while even at the fifth and sixth year testings, the percentage of the Control group showing unidimensional responding was comparable only to the Experimental group's first test performance, nearly two years before; 2) the Experimental group showed a significant shift to form, which is quite consistent with other research indicating advanced developmental performance; and 3) of those children in both groups who did not show dimensional preference, by far a greater percentage of the Controls, at each testing, showed response perseveration. When a child perseverates in his response, it seems, little or no attempt is made to attend to either color or form, since most (over 2/3) responses are made purely to position. As of the last testing (when children are between the ages of 5 and 6) only 20% of the Experimentals showed such responding, as compared to nearly 2/3 of the Control group.

We feel that in spite of the apparent simpleness of the task, it powerfully demonstrates the association of early intellectual development with the ability to impose order on the environment. This ability is basic to intellectual development. Previous reports of color-form preference have mainly featured the developmental shift in preference, rather than the early development of consistency in dimensional responding. Corah (1968, personal communication) has indicated that lack of unidimensional or consistent responding is characteristic of mildly

Fig. 3.5 Percentage of Experimental and Control Groups Showing a Tendency to Prefer

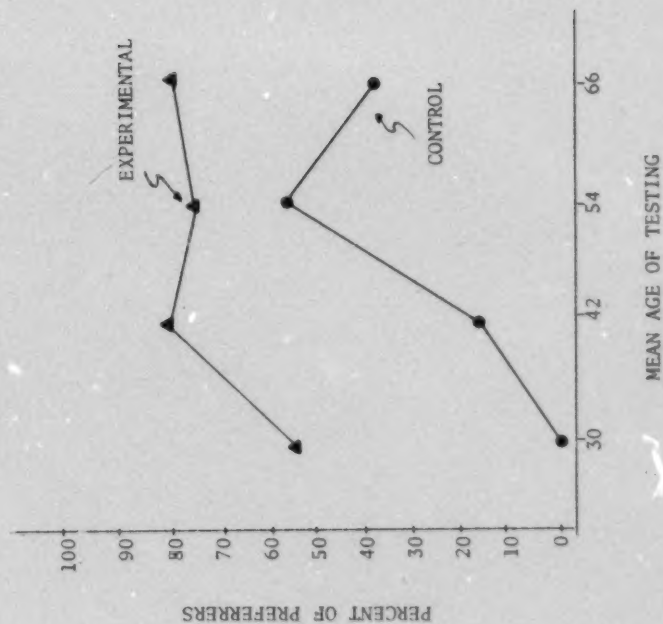
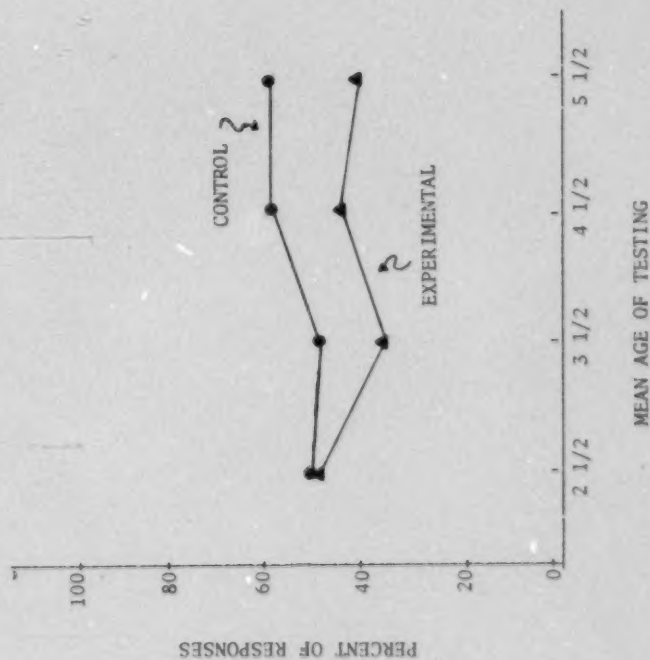


Fig. 3.4 Percentage of Responses made by the Experimental and Control Groups



retarded second and third graders. This difficulty in the performance of a learning task may be similar to the input phenomena discussed by Calfee (1970) in his studies of short-term memory. He suggests that the organization of stimulation for input is most critically lacking in sub-average intellectual functioning.

Differential Appreciation of Color and Form as Cues in the Discrimination of Varied Stimulus Configurations: We have pursued further our study of the development of the response behavior and the manner in which a child attends and appreciates a variety of stimuli. We were concerned, for example, with Olmsted and Sigel's (1970) suggestion that "color-form" preference is task specific; and other suggestions about how preferences change with the complexity (Huang, 1945), information value (e.g., Munsinger and Kessen, 1966) and/or the symmetry (Piaget and Inhelder, 1956) of the stimulus. Moreover, we wanted more information about strategy behavior and how that varied with the methodology and kinds of color-form stimuli.

We employed several tasks, but only a portion of them are reported here. The children are in the fifth and sixth years of life.

In the first study of this series we wanted to determine how children's preferences would be resolved in a situation where the stimulus display was more elaborate: there were four choices (two colors and two forms) from which to select. Secondly, we wanted to determine the strength of color and form as cues in conceptual tasks, e.g. matching missing part models to standards, matching reversed models to opposing standards. Thus, we tested the strength of the dimensional responses of the children in a variety of situations, with particular concern for how such behavior developed and the role it played in the early learning process.

In the first task, two different forms in two different colors served as standard stimuli. Immediately below the two standards was a four choice model array. The colors of two models corresponded to the colors of the standards, while their forms were nonsense form configurations. The two form models were simple outlines corresponding to the standard forms. The child was asked to choose the one of the four items that went with the things on top.

In this case an Anova revealed no significant differences in color-form responses between the two groups. However, there was a considerable amount of perseverative responding by the Controls (62%) and some by the Experimentals (5%). This behavior is an indication of the difficulty the children had in making a decisive response with so many choices available. Although, it was a more difficult dilemma for the Control children than for the Experimentals.

In the second task, the standard was a geometric form with a missing part. There were three models immediately below the standard: one stimulus in nonsense form; one stimulus which matched the missing part

in color but not in form; and a stimulus which matched the missing part in form. The missing part in each of 12 trials was simply a piece of the standard (e.g., a pie-shaped segment out of the circle standard, etc.).

On this task the Experimental group was significantly ($F = 4.58$, $df = 1,30$, $p < .05$) superior to the Control group in determining the missing part by color, but there was no significant difference between groups in determining the missing part by form. This was obviously a difficult task for the children, in general, but more so for the 4 year olds than for the 5 year olds, and more so for the Controls than for the Experimentals. Furthermore, the shift in orientation of a figure or its components changes the value of that figure (e.g., Suchman and Trabasso, 1966), particularly for young children. As a result, the relationship of the form to the model with the missing part was weakened so that color became the more salient cue. (A preliminary analysis did not show that dimensional preferences in Task I were consistently so in Task II.

In the third task, a reversal task, the standard stimulus was one of three geometric forms (a square, a circle, and a triangle) in two colors. The model stimuli immediately below the standard were presented in the reverse orientation of the standard's colors. When the triangle was the standard, the base was rotated but the orientation of the models matched the standard, while the color configuration was manipulated.

The Anova indicated that older children were significantly ($F = 9.84$, $df = 1,30$, $p < .01$) superior to the younger children in matching the reversed model to the standard. This difference in performance was buoyed mainly by the older Experimental children who were superior to all other children ($p < .01$). However, the younger children for both groups consistently chose ($p < .01$) the form model which matched the orientation of the standard, even though there was no color cue. It seems that the color reversal in the model affects what the child perceives as a change in the orientation of the figure and, thereby, a change in the value of the form -- for the younger children particularly. This finding indicates the remarkably powerful effect that color has in problem-solving tasks. In this case, the change in color seems to effect a change in the value of the form -- i.e., whether in actual shape or orientation, the effect is the same.

Thus, a number of behavioral phenomena appear in this series of studies. For example, as has been suggested by Suchman and Trabasso (1966) the attentional process and the associated system of response preferences are disturbed as the stimulus configuration is changed. However, the most telling effect of such changes is on the children who are developmentally less advanced -- in this case, performance is worse for the younger than the older and worse for the lower IQ Controls than for the higher IQ Experimentals. A clear indication of this came from the data on perseverative responding -- for example, in the first task, the

difficulty of 4 choices resulted in nearly 2/3 of the Controls perseverating as compared to only 5% of the Experimentals totally (no older Experimentals) and in Tasks 2 and 3 nearly half the Controls perseverate as compared to one-fifth or less of the Experimentals (no older Experimentals perseverated). The differential amount of perseveration or response stereotypy is suggested to be a manifestation of logical immaturity (Inhelder and Piaget, 1958) and represents a difficulty, a developmentally related deficiency perhaps, in the use of some higher order cognitive strategies in dealing with exteroceptive stimulation.

Assessing Response Strategies as a Function of Differential Reinforcement: Additional evidence for perseverative responding and the development of strategies was gained from a probability learning task. In this task no response is always correct, but a strategy of responding can help to increase the child's percentage of payoff. Actually, relatively little research has been concerned with the early development of children's decision-making and problem-solving strategies. Research into this performance is particularly important to all other learning performance characteristics of very young children, as well as being relevant to day to day life. For adults and older children, decision-making is usually influenced by evaluating the expected probabilities of a range of outcomes based on previous experiences which had similar configurations and sequencing of events (Weir, 1967). The young child, who has had only restricted opportunity to select among alternatives in general situations, cannot be expected to exhibit much control over environmental events. Attempts to evaluate the development of problem-solving strategies have utilized two-choice and three-choice discrimination problems. Usually such tasks are arranged so that stimulus events appear random and have no solution, but the subject actually is provided with the opportunity to maximize reinforcement and therefore demonstrate his attempts at solution.

Because young children change strategies over many trials in their search for a solution, the manner in which their response behavior changes, as they develop a "mode of attack," can be studied. Strategies change as a function of age (Weir, 1964, 1967), and intelligence (Harter, 1967; Moffitt and Coates, 1969). Weir (1964), for example, using a three-choice task, found that the young child's performance is simply a function of differential reinforcement and a strengthening of the response to the pay-off button, rather than performance based upon formulating and testing hypotheses, which is more characteristic of adults and older children. A strategy typically used by four to six year olds, but rarely seen in younger Ss and children 12 years of age and older, is single alternation. In this case, the stimulus chosen on a given trial is different from that chosen on the preceding trial. This strategy is more characteristic of that used by adults in the early stages of a problem solution.

Performance on this task has particular importance for the type of children who have participated in our early education program. In general, the research has shown that children from such low SES backgrounds have less well-developed cognitive abilities than their middle class peers

(e.g., Hess and Shipman, 1965). These results are usually explained in terms of cultural disadvantage; that the lower class child has not been exposed to as many different experiences as those common to the life of the middle class child, thereby impairing his decision-making process. When cognitive abilities are restricted at a critical period of life, an early plateau in cognitive development results, probably falling short of that which could potentially be achieved in a more advantageous environment.

Problem-solving strategies show a developmental change in complexity, i.e., as a function of age and IQ. The use of sophisticated strategies in problem-solving tasks is considered to be a reflection of the development of higher level intellectual processes at higher age levels, while the use of perseverative strategies is associated with more primitive cognitive functioning. This study examined the choice behavior and the development of hypothesis testing in children over a two year period.

The stimuli for the two-choice probability task were 2 inch red and blue squares. The child was instructed to find the right square. The red square was reinforced on 33% of the trials, while the blue square was reinforced on 66% of the trials.

Positions of the stimulus cards were randomized to ensure that the reinforcement for position perseveration or position alternation strategies was minimized. A correct response score was any response to a stimulus which was reinforced. The primary task measures were eight strategy scores, divided into four each, for the position and the stimulus dimensions of the task. Each strategy is defined in terms of reinforcement or non-reinforcement on one trial (win or lose); the outcome of this (stay or shift); and reinforcement or nonreinforcement on trial two, and the outcome on trial three.

The Anova revealed: 1) no differences in amount of reinforcement gained (i.e., number of correct responses) by any of the developmental groups; and 2) significant differences in the choice behavior or strategies employed by developmentally different groups of children.

The fact that there was no increase in the mean number of correct responses across trials for children in the age range studied is consistent with the developmental hypotheses of Weir, and the findings of other investigators (Weir, 1967). Children three to four years of age have usually attained, in the first ten to 20 trials of the task, a level of performance (i.e., number of correct responses) approaching the performance of adult Ss in the final phase of their task. Performance, according to the initial and final selection rate (i.e., frequency counts) of the correct response, for all the groups was at a rate consistent with chance levels. This indicates that the Ss failed to adopt a maximizing strategy often used by young children. In this type of discrimination task, in which reinforcement is randomly arranged, maximization of reinforcement is the only "solution" possible.

The absence of maximization in all groups suggests that subjects, irrespective of age and IQ, were responding to position rather than stimulus color. Thus the subjects appeared insensitive to the differential reinforcement of the two stimuli, failing to discriminate between 66 percent reinforcement and the chance level of 50 percent, which they could obtain by perseverating on the position dimension.

On the other hand, this study differs from the procedure and apparatus in Weir's (1967) study, wherein the procedure favored use of maximization as a strategy. In his study, responses to several levers were reinforced with each lever having a different reinforcement value throughout the task. Since the position of each lever did not vary, what Weir refers to as "maximization of reinforcement" is a position reinforced response. Since presentation of two stimuli was randomized for the variable of position in the present study, in order for a subject to maximize, he needed to eliminate systematically the irrelevant variable of position and respond in terms of the more salient task dimension of color. Once he began responding to the critical dimension, he could then discover which was the more frequently reinforced stimulus. And additional factor, considering the lack of maximizing as a strategy among these subjects, may well be that such young children find 66% and 33% a difficult ratio between which to discriminate.

The results of the strategy measures indicated both age and IQ associated differences in strategy behavior. The analysis of the position perseveration strategy revealed a strong tendency for three year old subjects used the search strategy of win-stay:: lose-shift about as often as they used the win-stay:: lose-stay strategy. Use of the perseveration strategy by four year old low IQ subjects may be associated with the expectancy for failure observed in retardates and lower class children. Children with a background of failure are less likely to search for a perfect solution and more willing to settle for the partial reward resulting from selection of the stimulus in the same position on every trial.

The high frequency of position perseveration among three year olds is characteristic of this age group, but it is regarded as a rather primitive strategy because its occurrence is independent of the outcome of the previous trial. Position perseveration has been found in infra-human species such as rats (Krechevsky, 1932; Lashley, 1929 and chimpanzees (Gellerman, 1933). Additional research with human subjects has found high rates of perseveration in young children (Hively, 1962; White, 1964) retardates (Ellis, 1958), and elderly persons (Levinson and Reese, 1963). Use of a win-stay: lose-shift strategy, on the other hand, is positively correlated with ontogenic level of development. It is viewed as a sophisticated strategy which involves both hypothesis formulation and testing, and the mediational process of short-term memory. Thus, equivalent rates of use of the two strategies of win-stay:: lose-stay and win-stay:: lose-shift by the Older High IQ group may be taken as an inclination that these subjects are more advanced in cognitive development than Older Low IQ subjects. They may be gradually shifting from

the stage in which perseveration is the dominant or preferred strategy to one in which complex prediction hypotheses are entertained.

Almost two years later, the replication of the probability matching task revealed nearly the same kind of performance difference between the two groups. (See Figures 3.6 and 3.7). Whereas, in the first testing, the older Controls perseverated more than the younger Controls, their rate has reduced somewhat. However, it remains at nearly $2/3$ for the older Control group and at $3/4$ for the entire Control group. Although both groups were reinforced at about the same rate (i.e., payoff), they performed very differently in their use of strategy. The Control group continues to show a greater tendency to perseverate, i.e., they continued to respond to either a stimulus or position irrespective of the consequence of their previous response. This compares to only $1/4$ of the Experimental group. This tendency to perseverate suggests that the children are insensitive to the reinforcement contingencies. They do not seem to appreciate the feedback to be gained from their response and, therefore, perseverate their response to position. Also, a number of the older Experimentals began to follow color, indicating an awareness of the differential reinforcement rate; and the result of having successfully found a strategy that paid off.

A response behavior which is quite important for future performance -- the strategy or style of perseverative responding -- thus appears to develop in the early years in a way which will interfere with later learning. Increasing research evidence (e.g., Kofsky and Osler, 1967) indicates that low SES children show an insensitivity to the reinforcement contingencies of a problem situation. They lack an appreciation of the feedback to be gained from their responses in a problem-solving situation.

Again, what is a rather simple task serves to demonstrate the development of behavior on the part of the Control children which will be antagonistic to (i.e., interfere with) later learning. The Experimental children show an attempt to impose some order on their environment -- an ability essential to intellectual development. A deficiency in this critical ability becomes quite apparent in the performance of various problem-solving and concept formation tasks.

Assessment of Concept Utilization: Oddity Discrimination: We employed an oddity-discrimination paradigm to provide the children with an opportunity to demonstrate how their attentional process and response preferences work in a rather complex task. In other words, it gave the children an opportunity to demonstrate their appreciation of the concepts of color, form, size, and number in ordering their world -- i.e., in a problem-solving situation.

The results of preschool age children's performances in an oddity-discrimination paradigm are inconsistent -- particularly regarding the age at which oddity problems can be solved. Several reports (e.g.,

PROBABILITY TASK

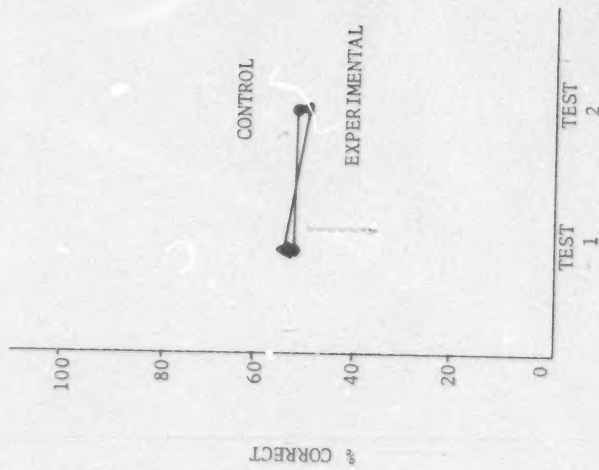


Fig. 3.6 Rate of Reinforcement over two years, between testings 1 and 2.

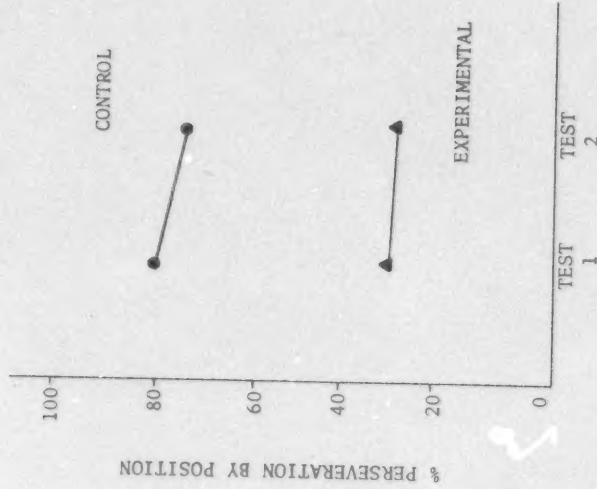


Fig. 3.7 Percent of group response Perseverating across two years, between testings 1 and 2.

Lipsitt and Serunian, 1963; Gollin and Schick, 1966) suggest that children younger than four years do not usually achieve oddity solution. Ellis and Sloan (1959) found little learning in subjects of MA less than 4 and successful learning in a majority of subjects of MA 6 or more. Harlow (1958) has, in fact, suggested that the oddity problem is too difficult a problem for young children.

We studied the performance of the children on a three-position oddity discrimination. The typical oddity task presents the subject with a horizontal array of three stimuli, one of which is discrepant. The subject must learn to select the odd stimulus on each trial, but he must be aware of which stimulus dimension is odd and which dimensions are not. The subject must learn to respond to a difference relation between the odd object and others of a set. To do this he must separate the variable dimensions (relevant dimension while discarding the irrelevant. Therefore, as House (1964) has suggested, the initial response is an attentional response to the dimension of the odd stimulus. Obviously, as we have discussed previously, the attentional response to dimensions is influenced by developmental shifts in preference, as from color to form. As Suchman and Trabasso (1966) have shown, such preferences change the probability of attentional responses to a stimulus, which can thereby facilitate performance when the dimension of preference is relevant, or interfere if the dimension of preference is not relevant. Huang (1945) noted that there is a developmentally related ease with which certain concepts are attained: form, color, and number fall along a dimension, with number being the most difficult concept to attain. However, these findings have not been well documented, e.g., we do not know the influence of IQ except in a general way and that is, that low IQ is associated with slowed developmental growth.

It is one thing to match on the basis of preference for one dimension over another, but it is another matter to demonstrate the appreciation of these concepts in a discrimination task in which the stimulus material varies along two or more dimensions. We investigated the differential ease of concept utilization as a function of developmental level. There were four conceptual dimensions: color, size, form and number; and in each case one of the dimensions was relevant, one was irrelevant, two were quiet and varied continuously. This was the case for all stimuli. The fact that concept oddity discrimination is a developmentally related complex learning ability (Lipsitt and Serunian, 1963) reveals itself particularly when a number of distracting variables are also used (Gollin, Saravo and Salten, 1967).

There were three defining conditions for the oddity task procedure: 1) the odd stimulus was located in any of the three positions and always reinforced; 2) each dimension was correct on an equal number of trials; and 3) the subject was permitted only one choice on each trial.

The stimuli consisted of 18" x 24" cards on which were pasted felt pictures of common objects such as a truck, chair, and bicycle. There were six cards per set. In each set of pictures there was one dimension critical to problem solution. Each set of stimuli also varied along another dimension which was irrelevant to solution of the oddity problem,

and two dimensions which were quiet. For example, if color was the relevant concept, then the following three items might be presented: one large blue triangle, one medium blue triangle, and one small green triangle. In this example, number and form are quiet, size is irrelevant, and color is relevant.

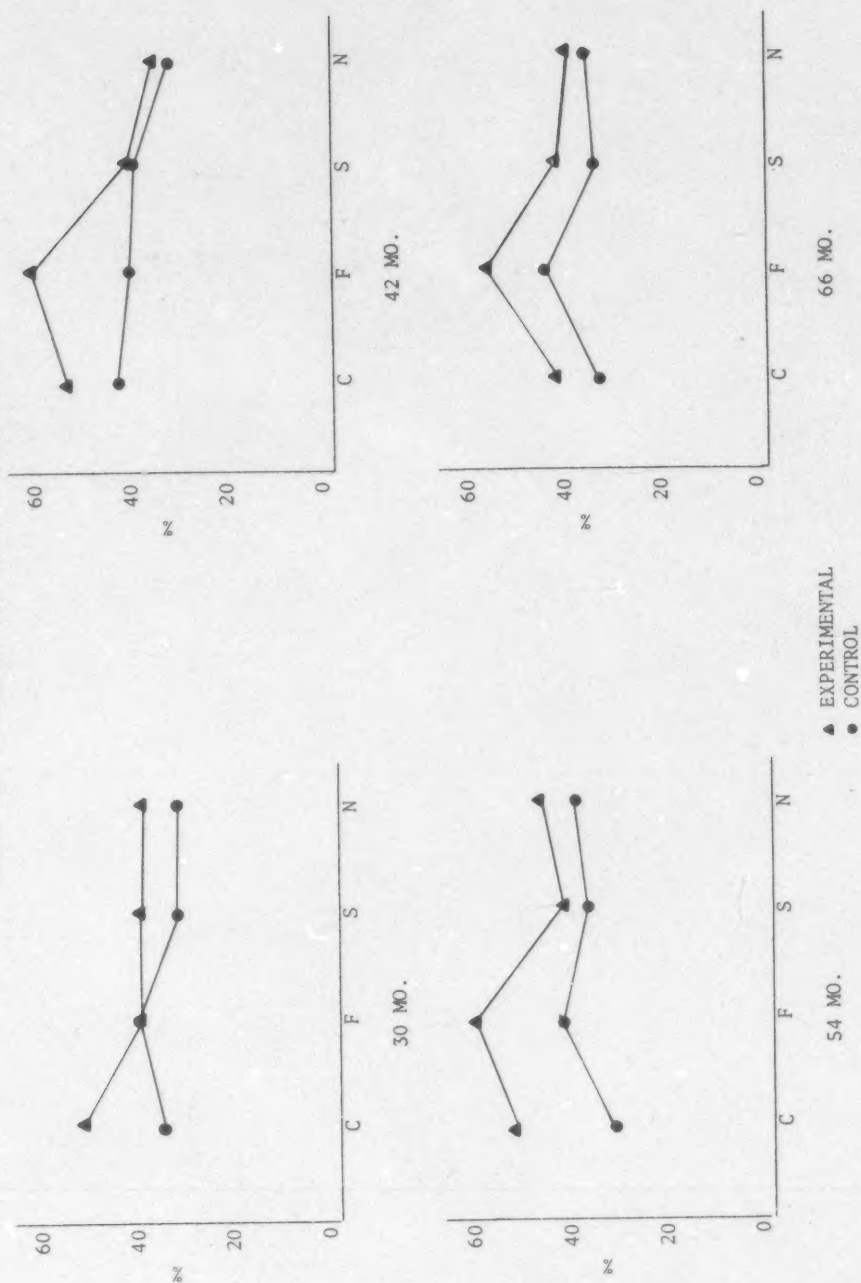
The basic stimulus dimensions used in this task are color, size, form, and number. Each stimulus dimension occurred in the trial sequence as both the critical and nonrelevant factor in problem solution. The position of the odd stimulus was altered so that it appeared in the three possible positions: left, middle, and right, randomly.

At the beginning of the experimental period, the subject was told: "I am going to show you some pictures, and I want you to point to the picture that is different." This was repeated prior to the presentation of each array of stimuli.

This task has now been replicated three times with the overall performance differential being consistently in favor of the Experimental group. The performance for both groups varies from dimension to dimension. An analysis of variance was performed on each of the dimension categories of color-relevant, form-relevant, size-relevant, and number-relevant. The Experimental group made significantly more form responses than the Control at all age levels beyond the 2 1/2 year mark. Performance on the color dimension is second best for the Experimental group, followed by size and number. The differential performance between the groups on each dimension across the years can be seen in Figure 3.8. The Control group's performance on color and size was about the same, with little difference between them even on the number dimension.

The recently administered color-form preference tasks showed a definite tendency for the Experimentals to prefer form. Obviously this preference can facilitate the performance of the Experimentals and it is just this point that underscores our earlier remarks regarding the development of attentional processes. Though it may be that dimensional preferences lead, in some situations, to response biases, it is also an index of the developmental process of selective organization of the stimulus environment. The earlier that such behavior occurs, the greater the facilitation of learning performance on just such kinds of tasks. In experimental paradigms which attempt to manipulate attentional processes, and which either disregard or assume response biases due to dimensional preferences are under control, an artifact is introduced in their results such that any performance difference between experimental groups may be spurious. In our case, the data points obviously to the facilitation of performance as a function of the degree to which early dimensional preferences have been established. What is taken to be a methodological complication in some studies we accept as a factor responsible for facilitating performance of preschool age children in problem solving studies. The Experimental group shows superior differential developmental performance, compared to the Controls.

Figure 3-8
PERCENTAGE OF CORRECT RESPONSES BY DIMENSION/AGE



The response behavior of the Control group was in many cases nonsystematic and nonenthusiastic, with a marked tendency to choose the middle stimulus as the odd stimulus.

It appears, then, that although oddity discrimination performance is influenced by chronological age, this is true only in part. Rather, a major influencing variable of the performance of preschool age children -- as it appears from these results -- is the level of intellectual development and the concomitantly developing response tendencies related to perceptual development. Further, the rate of solution in this kind of problem, as it must in all discrimination situations, varies not only as a function of stimulus factors inherent in the test situation, but the response tendencies which accompany each subject to the test situation. Not only has this study extended downward information about the discrimination task, but it has also supported the notion that success on such a task is highly related to the level of intellectual development.

Social and Personality Development (by Carol A. Falendar)

Every mother, especially if she is retarded, creates an environment for her child which is quite different from that created by other mothers, even though all may live in the same physical environment. Indeed, it is the very nature of the environment, created by the mother, which influences social, emotional, and cognitive development. The investigation of this relationship has been studied in detail by Hess and Shipman (e.g., 1968). They found that the mother's linguistic and regulatory behavior induces and shapes the information processing strategies and style in her child and can act either to facilitate or limit intellectual growth.

In the mother-child interaction, most sophisticated behavior -- such as the initiation of problem-solving behavior by verbal clues and verbal prods or the organization of tasks with respect to goals in problem-solving situations, etc. -- is done by the mother. However, where the mother is of low IQ, the interaction is more physical, less organized, and less direction is given to the child. Low SES mildly retarded mothers tend to regulate behavior by using imperatives and restricted communication -- a behavior control system which can stultify intellectual growth in her child. Furthermore, the nature of this interaction induces a passive-compliant attitude by weakening the child's self-confidence and dampening motivation. We were quite concerned, therefore, in determining the nature of the mother-child relationship, especially after having intervened in this critical process.

Investigations of the role of early environment upon cognitive development of the child have two approaches: 1) retrospective investigations, which attempt to relate the status variables of SES and race or culture to intellectual performance, and 2) observational investigations, which quantify process variables, such as interpersonal communication within the home, and relate them to intellectual performance. Eventually the process variables are reported as styles of response.

Researchers, using the retrospective approach, have found that learning and achievement vary as a function of SES. Mimbauer and Miller (1970) found the performance of middle SES preschoolers was significantly superior to a low SES group on a series of learning tasks. In addition, there was a mean IQ difference between the groups of nearly 30 points in favor of the middle SES children. Although other studies have also evidenced the existence of such differences between SES groups, they have provided little information about the nature of these differences. Milner (1951) found that children appreciated most, the time the mother spent in activities such as taking the children places and reading to them. Dave (1963) reported a correlation of .80 for achievement and such home environment variables as language models, academic guidance, and the stimulation provided in the home to explore various aspects of the larger environment; whereas much lower correlations (less than .50) are obtained for the relationship of SES and school achievement, education of the parents, and father's occupational status. These data indicate that what parents do in the home, rather than family characteristics, is most important.

More detailed investigations seek to understand the nature of the mother-child interaction and precisely how this process influences the mother-child interaction peculiar to SES levels. Bernstein (1960) distinguished between a restrictive and an elaborative speech pattern. The restrictive pattern uses imperatives to command behavior without explanation or rationale. The elaborative speech pattern, on the other hand, describes causal and contextual relationships. These speech patterns were found by Hess and Shipman (1965) to be used in the interaction of a mother and child by the mother to regulate and control the child's behavior. The two types of speech patterns relate to two styles of behavior control: 1) imperative-normative and 2) cognitive-rational. Hess and Shipman (1968) found that middle-class mothers tend to use the cognitive-rational control style in teaching their children, whereas lower class mothers use imperatives. The use of imperatives to control and regulate behavior is correlated with lower maternal intelligence. In addition, it is related to a cognitive style which uses relational grouping strategies -- in which a stimulus obtains its meaning from its relation with other stimuli, e.g., doctor: nurse. The use of relational grouping suggests relatively low attention to external stimulus details, subjectivity, and a categorical style of thinking. This style of thinking, Hess and Shipman have concluded, is engendered by the available information in lower class homes: it lacks context and causal relationships, and the intellect that develops results in deficiencies for the children in various types of problem-solving and conceptual behavior.

Using an experimentally structured mother-child teaching session, Hess and Shipman (1967) found several specific maternal behaviors which affect the child's learning: 1) prompt maternal feedback is most necessary to the child's learning of the task; while task-informing, engaging, and control behaviors were not; 2) the greater the proportion of mothers' messages asking or telling the child to manipulate the blocks, the less

likely is the child to learn the task; 3) more intelligent mothers use fewer physical commands; 4) there is no correlation between maternal intelligence and propensity to use verbal commands or verbal questioning; 5) the use of questioning to evoke verbal information was correlated with maternal intelligence and with the child's learning of the task. In an additional analysis of the data from the same population, Brophy (1970) also found that only middle SES mothers consistently engaged in employing an initial orientation to the task: i.e., she asked the child to focus his attention on the stimuli or gave prereponse instructions specifying appropriate verbal labels.

The nature of the mother-child interaction characterized by the Hess and Shipman analyses is quite consistent with such theories of language and thought development as Vygotsky's (1962) hypothesis that speech becomes internalized thought. In other words, the foundation of early language, as a function of the mother-child interaction, determines the organization and quality of thought. Luria (1961) suggests that the degree to which this speech has been internalized can be indexed by the extent to which a child seeking help from adults makes use of this help; i.e., how the child applies the results to his independent activity thereafter.

We utilized several techniques to assess differences in the mother-child interaction between the Experimental and Control group mothers with their children. We conceptualized the child as being the center of the input-feedback system which involved both the parent and extra-familial stimulation. In conceptualization, the dynamic feedback loop between the mother and the child represents how the amount of responsive behavior and the conceptual styles both contribute toward determining the nature of the interaction.

We have completed two replications of our observation of structured mother-child interaction sessions, separated in time by two years. Both sessions were videotaped and rated later to provide several kinds of information, including 1) how the mother performs on a learning task; 2) how, on a problem-solving task, the mother and the child interact; 3) how the child performs on various tasks independently, and 4) the nature of the language used by the mother in her communication with the child.

Study I

Our first study evaluated the nature of the information transmitted in the teaching and interaction patterns of the Experimental and Control mother-child dyads. We studied the kind of feedback between mother and child by observing the types of controls, reinforcements, and teaching methods employed. We used a specially prepared laboratory for all experimental sessions. The testing room was equipped with video tape and sound recording equipment, so that the entire session with each family was recorded for later analysis. The mother and child were brought to the laboratory and seated at a table. Part of this research involved explaining to the mother the tasks she and the child were to perform.

(1) First, the mother was asked to tell her child a story based upon the lion card of the Children's Apperception Test (after Hess and Shipman, 1968). Sentence length, syntactic structure, content, and abstraction (proportion of abstract nouns and verbs in relation to the total number of nouns and verbs used) were taken as measures of the mother's language facility.

(2) Second, the mother was told to teach the child the following two tasks: a) to sort a number of blocks by both color and form, and b) to teach the child how to copy three designs on a toy Etch-A-Sketch.

The behavior between the mother and child was rated on a scale (after Caldwell, 1968) with rating categories divided into various kinds of physical and verbal behaviors, with additional categories indicating whether the behavior was active or passive. In addition, the parent's behavior toward the child, the child's cooperation, affection, and level of achievement with the help of the parent were noted. From these ratings, the various dimensions of mother-child interaction were evaluated.

The preliminary analysis for these sessions between mother and child has been directed toward evaluating the amount and nature of information transmitted and shared between the mother and child of each group. The raw data was a frequency count of the types of responses observed from the dyad. Each of the rated behaviors was grouped into one of twelve stimulus and twelve response categories similar to the Table found appended to this section. Each two events (mother-predicate, child-predicate) was considered one sequence: one stimulus, one response. Attneave's (1959) information theory analysis was then applied.

The information transmission analysis revealed the Experimental mother-child dyads shared more information than the Control dyads. (See Figure 3.9.) The Experimentals also had less "equivocation of transmission:" given a certain stimulus there was less uncertainty concerning the response elicited. The children of both groups exhibited more general behaviors than the mothers of either group, with no significant difference between the Experimental and Control children in general behavioral emission level.

Experimental mother-child dyads used significantly more verbal-verbal transmissions than Controls and significantly less physical-physical interactions than the Controls ($p .01$). In addition, Controls had more verbal-physical sequences in which the mother initiated verbally and the child responded physically. (See Figure 3.10). The Experimental dyads performed more of the opposite sequences: the mothers initiated a physical behavior, the child responding verbally. Finally, the Control children and mothers initiated more "ignoring" behaviors than the Experimental children or their mothers.

Fig. 3.9
MOTHER-CHILD INFORMATION TRANSMISSION

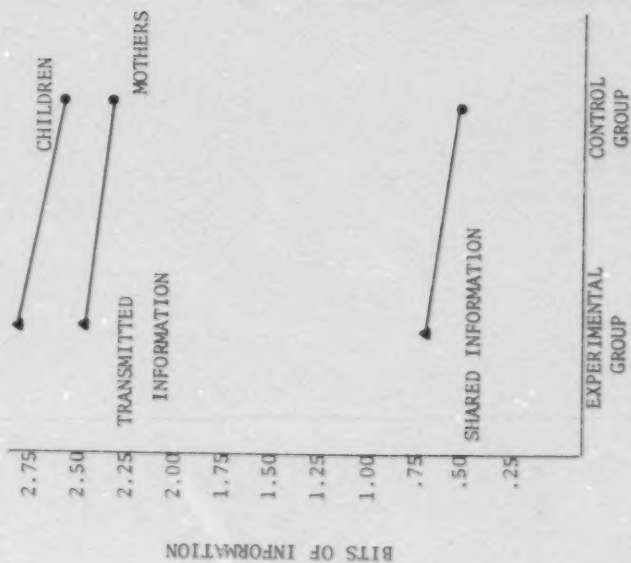
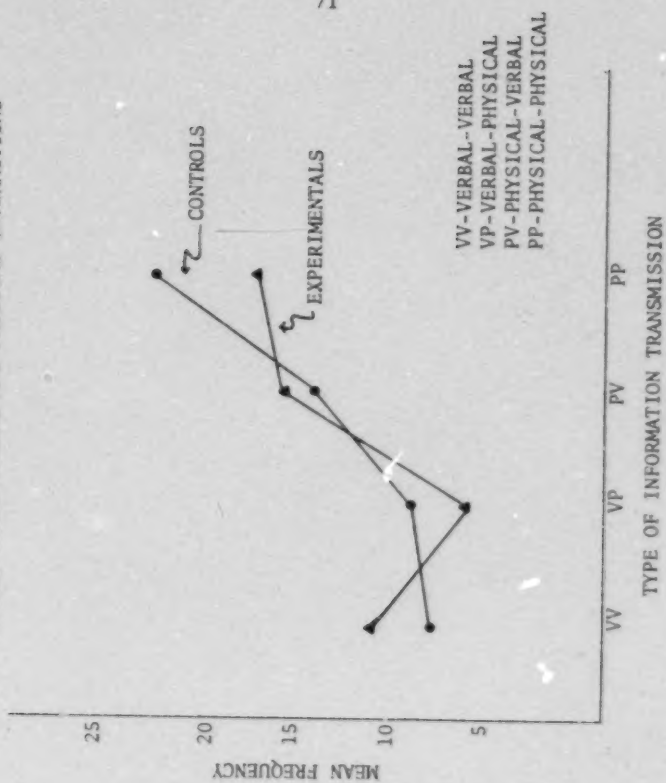


Fig. 3.10
MOTHER-CHILD VERBAL AND PHYSICAL INTERACTIONS



As expected, the Experimental children transmitted more information than the Controls, and both groups of children transmitted more information (but not a significantly different amount themselves) than the mothers of either group. However, there was a greater amount of shared information in the Experimental dyads, and, since there is no significant difference in the amount of information transmitted by the mothers, these data suggested that in the Experimental dyad, it was the child's responses which were primarily responsible for the information communicated within the dyad and the greater amount of shared information found between dyads. The preschool program has stressed general language development, with emphasis directed particularly to the development of expressive verbal behavior. This behavior has generalized from the school situation, it appears, to the home and the mother-child interaction. In fact there is the possibility that this generalization effect is the beginning of a feedback loop between the Experimental mothers and their children, a possibility additionally supported by the difference in the amount of verbal teaching by the Experimental mothers.

Further support for the effectiveness of the program is the superior performance by the Experimental children on the Block Sorting task. The results of the percentage analysis are comparable to the results of Hess and Shipman (1967). About one-fourth of the Experimentals' responses were in the verbal categories of supplying verbal information and of answering a question. This stands in contrast to the Controls, with only 10% of their responses in these two categories. Hess and Shipman (1967) have emphasized the importance of verbal information in a teaching situation particularly as a responsibility of the mothers. They found that maternal IQ, the mother's type of questioning to evoke verbal information, and the child's task success to be positively related. In our study, however, it appears that the Experimental children themselves were the main force in supplying verbal information and thereby initiated verbal communication. In effect, they verbally oriented themselves in response to the mother's covert stimulation. In contrast, when the Control mothers would verbally request behaviors from the child, the child's response was most often physical. In Hess and Shipman's (1967) research, they found a negative correlation between task success and direct demands for physical behavior (for a nonverbal response). The Control children did not seem to initiate enough verbal interaction to guide the session or to respond consistently to maternal behaviors.

Although there were no significant differences in frequency of behaviors by category between Experimental and Control mothers, the Experimental group attempted to evoke verbal behavior from their mothers more than the Controls. This may be related to the demand characteristics of the situation. In other words, although the children of both groups may have a low expectancy for a verbal response from their mothers, the Experimentals continue their attempts to evoke such responses. In this case the child acts as the active member of the dyad.

Whereas the Experimental children have been separated from their mothers a great portion of their waking hours since they were six months old, the Control dyads have spent much time together. In light of these

results it appears that physical proximity is not sufficient for efficient and effective communication between mother and child. It is also possible that because the Experimental children talk and express themselves so freely in general, i.e., even at home, their mothers are beginning to respond in kind. The Experimental children may be able to structure the information transfer themselves, thereby guiding the mother in the teaching situation.

In summary, the data suggested that the nature of the preschool program, with its emphasis on language development, facilitated information transfer in the mother-child interaction among the Experimentals. It was the Experimental children who appeared to be responsible for guiding the flow of information, providing most of the verbal information. The mothers of the two groups showed little difference during the teaching session. Instead, the Experimental children's responses led to a greater amount of shared information among the Experimental dyads.

Study II

Our replication study of the mother-child interaction was completed nearly two years after the first. We were particularly interested to see if the feedback phenomena we noted earlier from the Experimental children to their mothers had increased. The first study revealed a dominant role of the Experimental children in directing portions of the interaction with their mothers. There was some evidence to indicate a beginning effort by the Experimental mothers to initiate verbal behaviors in addition to the behaviors evoked by their children's questioning. We expected that the feedback effects observed earlier would not be more generalized, both in the interaction session and in maternal behavior as a function of the Experimental children's exposure to the Project's continuing emphasis on expressive language.

We improved our methodology somewhat to evaluate more adequately the interaction between mother and child. This time all experimental sessions were conducted in a specially designed mobile laboratory. As before all sessions were video-taped through a one-way mirror and rated at a later time. In addition: 1) the Block Sort task was changed so that size and height were relevant dimensions and color and shape were irrelevant; 2) the mothers learned the Block Sort task to criterion before teaching it to their child; 3) task score was based on the child's placement of additional blocks after the learning session as well as the piles made during the session; 4) instructions were given to the mother and child together to draw a square on the Etch-A-Sketch (ES); 5) the rating scale was revised to more directly reflect the immediately relevant behaviors (see Appendix to this section).

Information theory analysis revealed that the Experimental mother-child dyads had a greater association between behaviors than the Controls on both tasks. Given a certain behavioral pattern, there was a greater chance that the two behaviors, one by the mother and one by the child, would occur again. Also, on this task, there was significantly less equivocation of information from the mother to the child by the Experimentals, i.e., greater certainty of a particular maternal behavior, given the child's behavior.

There were distinct qualitative differences between the behaviors of the Experimental and Control groups. On the Block Sort task, the Experimental children asked significantly more questions of their mothers. On the Etch-A-Sketch, Experimental children used significantly more verbal orienting and informing behaviors than the Controls, who enacted significantly more physical blocking and assault behaviors. On the Etch-A-Sketch, the older Experimental children used more positive verbal feedback than any other group. Older children from both groups enacted more control statements with no reasons or rationale given and more refusals. All the Experimentals, followed by the young Controls, gained higher task scores than the older Control children.

Thus the results indicate that the feedback effects evidenced in the original mother-child interaction study were, as expected, more pronounced as a function of the two additional years of stimulation and maturation. The coordination of maternal and child information was more closely associated for the Experimental dyads than the Controls on both tasks. This suggested continued development of the stable response patterns observed in the earlier study.

There was additional evidence that the child directs the information flow. For example, on the Block Sort task, when the mothers alone were given instructions, the Experimental children asked more questions and enacted more verbal behaviors than the Controls. Correspondingly, the Experimental mothers responded with more verbal cues for manipulation and sorting to requests than did the Control mothers. It appears that while the Control mothers directed the BS task with their children, the Experimental mothers were being questioned by their children to elicit the instructions. The role of the Experimental children can be seen more clearly in the Etch-A-Sketch where both the mothers and the children were given the task instructions. In the Control dyads the mothers directed this task, resulting in the greater amount of information being transmitted by them, compared to the Experimental mothers. In the Experimental dyads the older Experimental children guided the interaction and transmitted more information than any other group. Further, Experimental children utilized more verbal orienting and informing behavior as well as commands; and the older Experimental children used more positive verbal feedback in contrast to the Controls who enacted more physical behaviors. On this task, the direction of teaching appears to be from the children to their mothers, at least in the Experimental dyads.

These results indicated an increased efficiency of communication in the teaching situation between the Experimental children and their mothers. The high task scores obtained by the Experimental dyads were the result of the Experimental children's assumption of responsibility for the communication of information. This held true especially for the older Experimental children who provided task structure in the form of questions and praise to their mothers. In contrast, there were fewer consistent or cooperative responses in the Control dyads. Although the Control mothers attempted to direct the session, they appeared to lose sight of

the goal: e.g., the sorting categories they had learned. Neither group of mothers utilized verbal labels for the BS groupings. However, the Experimental children were able to "abstract" the categories through their mothers' active sorting while the Controls were not. These results coincide with the Hess and Shipman (1965) findings that low SES, low IQ mothers are unable to structure a learning situation but are adept at suppression of undesirable behaviors. Indeed, we found that the majority of the Control mothers' verbal commands were specific suggestions such as "Put that one here." These suggestions are means-oriented, and lack reference to a final goal.

It seems that the extensive expressive language orientation of the stimulation program has provided a positive model for the Experimental children. As a function of their participation they are able successfully to structure a learning situation and to guide and adapt the behaviors of their mothers. Possibly too they are transmitting some expectation of success in the learning situation to their mothers which facilitates her performance during her original task learning.

Again, we reiterate that in spite of the fact the Control dyads have spent much more time together, in contrast to the Experimental dyads, this physical proximity is apparently not the crucial characteristic for the development of the mother-child interaction. The lack of face-to-face interaction with adults, the low value placed on verbal interaction, and the rewarding of behavior which leaves the adults alone (all described as characteristic of low SES homes) may account for these findings. In fact, the value of day-care may not be only in the feedback the child provides to his home environment but, more, that the child forms attachments to several people and as a result not only enjoys but benefits by interaction with a number of people (Caldwell, 1972).

Cognitive and Conceptual Style and Field Independence

At the completion of the interaction session, the mother and child were taken to separate rooms and administered measures of conceptual tempo. The maternal measure was the Matching Familiar Figures Test (MFFT); and the child's was the Kansas Reflection-Impulsivity Scale (a children's version of the MFFT). Conceptual tempo is measured along a dimension defined by speed of response and is related to a variety of response styles. The styles of responding on the dimension are impulsive vs. reflective responding. Impulsive refers to subjects who respond quickly with a large number of errors on a measure; while the reflective responder requires long response times and has a low error score on a test series.

At a second session two weeks after the interaction session, the child was administered two additional tasks:

(1) An adaptation of the Siegel Sorting Task which is a series of line drawings of stimulus forms of animals, people and objects. The experimenter asks, "Which two go together and why?" This test provides a

measure of the conceptual style, presumed to have been affected by the mother who has shaped the child's environment and the child's emerging perceptions. There are three categories of styles which can be determined from the matchings of pictures: i.e., which two pictures go together and why? The relational category involves temporal or spatial contiguity; no stimulus is an independent instance of the concept, for each depends on the other for membership. The second category is the analytic-descriptive, and sorting is based on similarity of objective parts of the total stimuli. The third category involves an inference about the two stimuli chosen rather than the objective attributes of each.

The relational response requires the least amount of analysis of the stimulus array. Low SES mothers tend to use relational groupings, which indicates low attention to external stimulus detail and subjectivity. Impulsive mothers tend to use relational categories more frequently than reflectives do.

(2) The children's Embedded Figures Test which is a measure of field dependence-independence, administered according to standardized instructions. Field dependence is defined as an inability either to separate figure from ground or to orient oneself in space with conflicting visual cues. (Witkin, Dyk, et al., 1962) Field independence refers to the ability to perform these tasks. Field dependent individuals are dependent in their social relationships, suggestible, conforming and likely to rely on others for guidance and support.

Children in the Experimental group responded at a developmentally more sophisticated level on these three measures than the Control children. Experimental children utilized sortings based upon categorization and description, both strategies involving analysis of the stimulus display. In contrast, the Control children had difficulty verbalizing the type of sorting they had chosen and tended to use strictly relational sorts, based upon the least amount of stimulus analysis. It appears that the stimulation program has facilitated the Experimental children's development of sorting strategies. These findings are consistent with Hess and Shipman's reports that low IQ mothers often use relational groupings or are unable to label sortings at all.

The Experimental children as a group were more field independent: able to find more embedded figures in the stimulus displays. This is further evidence of increased perceptual sophistication on a measure which is correlated with other aspects of personality development (Witkin, et. al.). Field dependence is associated with passivity and dependence in interpersonal relationships. A field independent individual is able to ignore certain misleading environmental cues and analyze the environmental input efficiently. This finding, incidentally, coincides with the findings for the differential performance of the two groups of children in the learning tasks.

In summary, then, we found that the Experimental dyads transmitted more information than the Control dyads, and this was a function of the quality of the Experimental child's verbal behavior. The Experimental children supplied more information verbally and initiated more verbal

communication than children in the Control dyads. The children in the Experimental dyad took responsibility for guiding the flow of information -- providing most of the verbal information and direction. The mothers of both dyads showed little differences in their teaching ability during the testing session. However, in the Experimental dyads, the children structured the interaction session either by their questioning or by teaching the mother. As a result, a developmentally more sophisticated interaction pattern has developed between the Experimental children and their mothers, which contributed to faster and more successful problem completion.

It is apparent from this description of a portion of the data of the mother-child interaction, that the intervention effort has effectively changed the expected pattern of development for the Experimental dyads. Moreover, the result of what might be termed a reciprocal feedback system, initiated by the child, has been to create a more sophisticated and satisfying interaction pattern in the Experimental dyad. There is, in fact, some evidence that the Experimental mothers may be undergoing some changes in attitude and self-confidence. The Experimental mothers appear to be adopting more of an "internal locus of control" -- an attitude that 'things happen' because of their decisions and actions and not purely because of chance or fate. Thus the intensive stimulation program, undergone by the Experimental children, has benefitted both the Experimental child and the Experimental mother by broadening their verbal and expressive behavioral repertoire.

Revised Behavioral Rating Scale

VERBAL CATEGORIES

Information Processing

- 01 Orienting, presenting general instructions, task information at task onset
- 02 Informing, giving, offering specific task information in ongoing task, referring generally (perhaps by gesture) to task materials
- 03 Verbal labeling: giving verbal classifications with reference to task materials
- 04 Requesting verbal feedback -- asking task-related question requiring a verbal response
- 05 Requesting physical feedback -- asking task-related question requiring nonverbal (physical) response
- 06 Rephrasing instructions -- rewording information previously given
- 07 Self-directed verbalization -- spoken as if to self, task-related
- 08 Imitation of speech

Positive Feedback

- 10 Corrects, verbally redirects ("instead of putting the block here, put it in this pile" or "stop, now turn the dial this way")
- 11 Expresses general positive expectation, encourages ("I know you can do this")
- 12 Verbal confirmation ("yes," "umhmm," "that's good") -- task-related
- 13 Expresses affection: gives verbal indication "I love you"
- 14 Expresses affection contingent upon task performance
- 15 Answers question in response to verbal request for information

Negative Feedback

- 16 Control 1: Stops, inhibits, forbids, a firm command that an act be terminated (no reason given)
- 17 Control 2: Orders other person to perform act: imperative task-related
- 18 Control 3: Inhibits for reasons of norms, status: "None of the other children (boys/girls) do things like that."
- 19 Control 4: Stops, inhibits, with a reason given: task-related activity and rational explanation: "Don't throw the blocks on the floor because then it will take longer to sort them."
- 20 Control 5: Inhibits and threatens withholding love or later reinforcement
- 21 Control 6: Inhibits and threatens punishment at later time
- 22 Ignores request
- 23 Refuses to perform, act, cries "no"
- 24 Task-unrelated verbal behavior
- 25 Desire to terminate "I don't want to do this anymore"
- 26 "No," "Uhuh," negative

PHYSICAL CATEGORIES

Information Processing

- 50 Pointing at or pointing toward
- 51 Demonstration
- 52 Limiting stimulus materials -- removing same from immediate range
- 53 Responds physically to request for action
- 54 Attending behavior
- 55 Takes or handles item
- 57 Throws or rolls item

Positive Feedback

- 60 Nonverbal affirmation, nods, smiles
- 61 Tactile confirmation, pats, touches, affection
- 62 Physically redirecting, turning child around
- 63 Waits for verbal or physical confirmation

Negative Feedback

- 70 Physical blocking
- 71 Physical assault
- 72 Ignores, turns away from task
- 73 Task-unrelated physical activity
- 74 No response

Measurement of Language Development

Two major concerns in the language measurement program were the evaluation of effects of altered experience upon the linguistic development of the Experimental group in comparison to the Control group and the study of language development as a continuous process. Research in developmental psycholinguistics has used three measures for determining the level of a child's linguistic development: (1) imitation - the child's ability to repeat grammatical structures presented to him as models; (2) comprehension - his understanding of these structures; and (3) production - his ability to produce the structures himself. Our language testing program has utilized these three measures by supplementing its collection and analysis of free speech samples with a Sentence Repetition test and a Grammatical Comprehension test. These methods of analysis have been adapted by the researchers in our language laboratory from models developed elsewhere. Use has also been made of a standardized test, the Illinois Test of Psycholinguistic Abilities (ITPA). Altogether, the results of these tests provide a comprehensive picture of the language development of the children in the project.

Free Speech Analysis: Cross-Feature Tabulation

The analysis of the child's free speech provides information on his linguistic production in unstructured stimulus environments. The child's speech is elicited in an environment containing familiar stimulus objects and a familiar person (a Black female language tester). This setting permits the child to manipulate objects common to daily life settings, and facilitates actual sampling of his language production. The speech is recorded on tape for later transcription and analysis.

Samples lasting 45 minutes were collected at three-month intervals beginning at the age of 18 months. The recorded samples from children 18 to 35 months old were completely transcribed and analyzed; thereafter, only 15-minute portions of the samples were used. The transcriptions were analyzed for a number of quantitative features: 1) total number of utterances; 2) number of single-word and multi-word utterances; 3) number of repetitive utterances and spontaneous utterances; 4) total number of morphemes; 5) morphemes per utterance; and 6) number of unique vocabulary items. The occurrences of these features were counted per transcript, then mathematically reduced to a ten-minute sample in order to make comparisons across all age periods.

Total number of utterances. An utterance is defined as any discernible word or set of words between pauses. The Experimental children were more verbal (in terms of mean number of utterances) than the Control children until 30 months. At this point, the differences between the groups became less marked, one group sometimes being more verbal than the other. It is worth noting that only one Experimental child did not produce intelligible speech (at 18-21 months), whereas there were several Control children who at different times produced no utterances until after the 30-month period.

Number of single-word and multi-word utterances. In the first stages of language acquisition, children generally use only single-word utterances. However, when our language sampling began, both groups of children had begun to use multi-word utterances, with the Experimental group having a larger percentage of multi-word utterances than the Control group. At three years of age, both groups were producing multi-word utterances at the rate of 75%; thereafter, the percentage increased to 80% for both groups.

Number of repetitive utterances and spontaneous utterances. Repetitive utterances represent one of the first processes of language learning in the young (Brown and Bellugi, 1964). As linguistic facility develops, we may expect an increase in spontaneous utterances. At 18 months the Experimental group's repetitive utterances constituted 39% of their total utterances, while the Control group's repetitive utterances constituted 67%. Thereafter, both groups increased their spontaneous utterances to over 90% by 33 months.

Total number of morphemes. All lexical items were counted as morphemes, as were inflectional endings. For example, the word cat is a single morpheme while cats is counted as two: cat and s. The Experimental group used more morphemes than the Control group at all age levels, even when the Control children had more utterances. The fact that the Experimental group used longer utterances, shown by the morphemes per utterance measure (see below), may account for this difference.

Morphemes per utterance. While the preceding measures (such as total number of utterances) reflect gross quantities of verbal output, the number of morphemes used in an utterance more clearly reflects sentence complexity. This measure has been used by Brown and Bellugi (1964) as a partial indication of linguistic maturity, on the assumption that the child who says "man run" exhibits an earlier stage of linguistic development than the child who says "the man runs." Although certain constructions may include superfluous morphemes (e.g. the man ranned), our findings indicated that such occurrences were minimal and did not substantially change the number of morphemes per utterance for either group. On the basis of this measure, it can be seen from Figure 3.11 that the Experimental group demonstrated greater linguistic facility at all ages.

Vocabulary. The first occurrence of each word was counted as a unique vocabulary item and inflectional morphemes were ignored (that is, cat and cats were counted as a single vocabulary item). Proper names such as Santa Claus were counted as unique items, as were compounds such as shopping bag. An exception was made for cases in which one of the parts of a compound was found to be productive. For example, if shopping bag and paper bag occurred, bag was counted as a vocabulary item, as were shopping and paper. This would result in a count of three as opposed to the two that would result from counting only the compounds.

The Experimental group had a greater mean number of unique words in all early free speech samples (Fig. 3.11a). The differences between the groups were greatest at the early age levels; but, if greater vocabulary usage were a function of expressiveness, we would expect the differences between the Experimental and Control groups at the later month periods to fluctuate in the same manner as the mean number of utterances. However, even when the Control group produced more utterances, the Experimental group still had a greater mean vocabulary. In fact, at the 48-month period the Experimental children had more unique vocabulary items than they did total utterances.

Discussion. Gross Feature Tabulation of free speech was most sensitive at the earlier month periods. The decreased sensitivity at later month periods parallels Lenneberg's observation that production becomes unreliable as an indicator of language capacities by about 30 months (Lenneberg, 1967). Free speech analysis did demonstrate that the initial language growth of the Experimental group was superior to that of the Control group. After the earliest age periods, gross feature analysis did not consistently differentiate the groups. The quantitative measures yield some interesting developmental trends. The first eight to 12 months of growth (18 to 30 months) seems to be a critical period of development for the Experimental group. Even though number of morphemes is obviously highly interrelated with total utterances, the fact that the Experimental children are producing a significantly larger number of unique vocabulary items than the Control children, and are also using utterances that are almost 50 percent longer, gives added meaning to the measure of gross numbers of morphemes.

Gross feature tabulation for the analysis of free speech samples is most sensitive to early language growth. However, the behavior of the Experimental children between 1 1/2 and 2 1/2 years of age is very different from that of the Control children. It is difficult to know what the true implications of such behavior are, but it certainly suggests that just as in other kinds of psychomotor development, the emergence of certain types of refined

Figure 3.11

MORPHEMES PER UTTERANCE

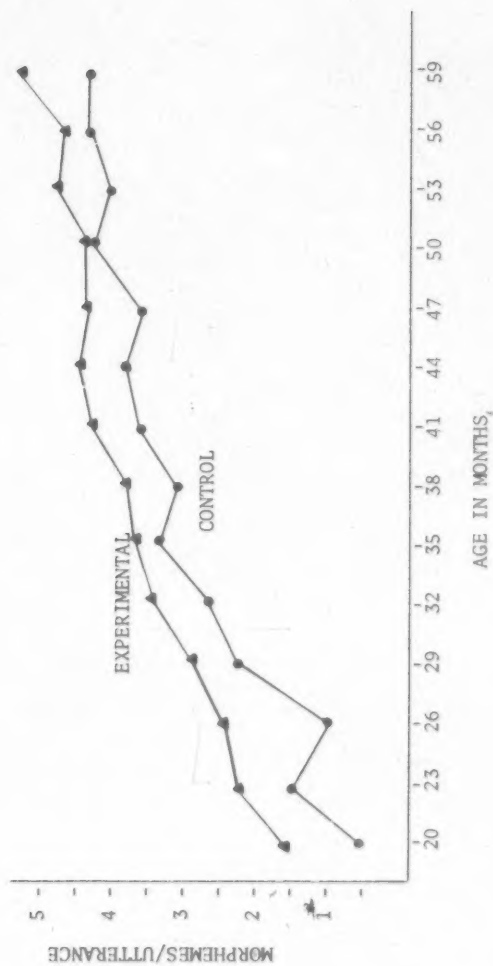
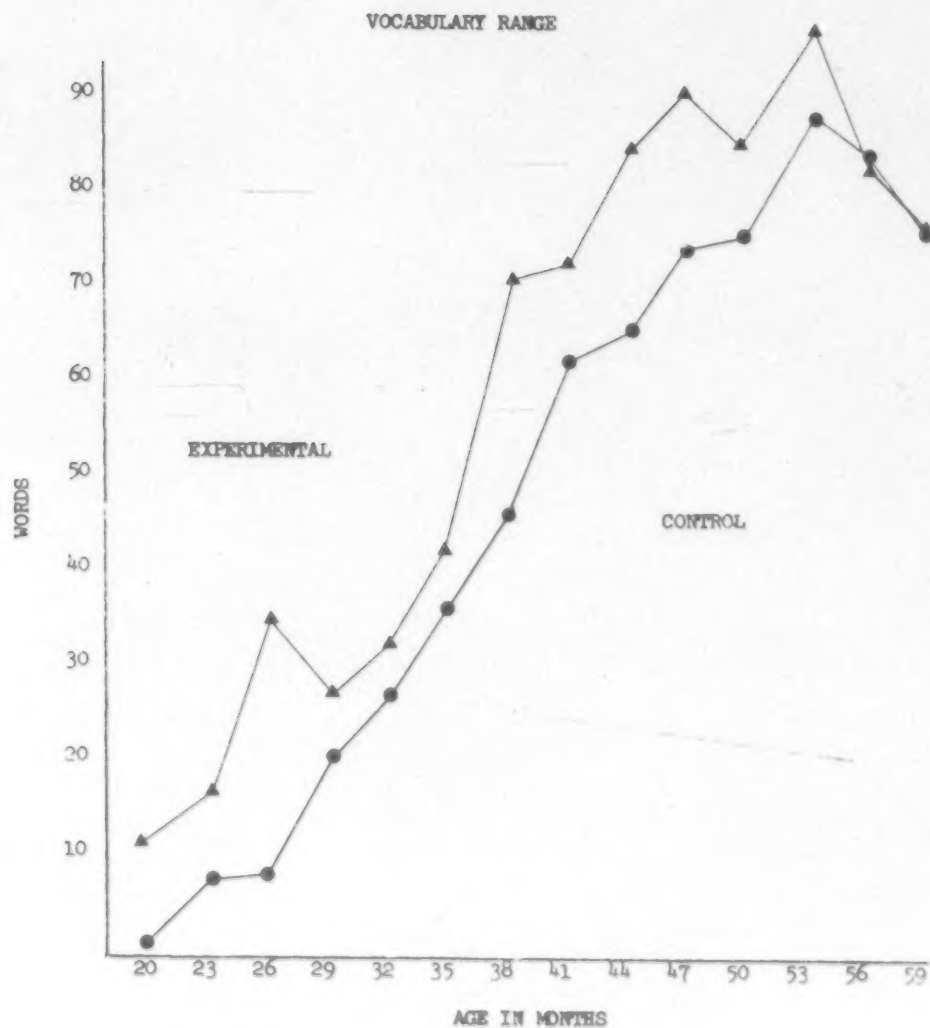


Figure 3.11a



and developmentally sophisticated behavior is preceded by a period of intense practice on the part of the child--whether it be grasping, walking or talking. Therefore the period between 18 and 30 months is of critical importance to future language development.

It is in this early period that language tends to be used to react to situations and make commentary all with a demonstrative or identifying remark. Later, language tends to act upon the environment in attempts to initiate or actively appreciate the situation. These attempts introduce the abstract and more complex syntactic aspect of thought and language. This thesis is consistent with the treatment of thought and language by both Vygotsky and Piaget.

The Sentence Repetition Test

A child's performance on imitation tasks can be taken as a reliable predictor of his performance on other linguistic tasks. An evaluation of the errors made by children attempting to repeat prepared test sentences is also a useful index of differential linguistic development. We have administered a sentence repetition test (SR) to the E and C groups in an attempt to assess their imitative abilities and the level of linguistic competence reflected by those abilities. The test consists of 34 sentences representing 16 clause types and their transformations. It has been administered at three-month intervals beginning when the children were 36 months. The sentences vary in length from four to eight words and from five to eleven morphemes, and range in complexity from kernels to double-base transformations. The transformations most commonly represented are the negative, yes/no interrogative, wh-interrogative, passive, and do transformations.

The language examiner for all the tests has been a middle-aged black woman. Each session is begun by putting the child at ease, mainly by playing with various toys in the examination room. After several minutes the examiner gives the child the directions for the test ("I want to see if you can say what I say. Can you say this? Say, 'Frank ran in the street.'"). Each sentence is repeated once if the child does not respond or if his response is inaudible.

The test takes from seven to fifteen minutes to administer. Each session is recorded on tape and later transcribed and scored in the laboratory by trained linguists.

Analysis of Data: Responses are classified according to the following scale:

- I. EXACT REPETITION
- II. IMPERFECT REPETITION
 - A. Transpositions
 - B. Omissions
 - C. Substitutions or additions
- III. NO REPETITION (silence, babbling, talking about something else)

Each of the imperfect repetition categories is subdivided into major (clause, phrase, and lexical-item) and minor (function-word and marker) levels. Transformations and other recodings, whether grammatical or not, are included under the category of substitutions or additions. Minor phonological distortions are not counted as deviations.

The scoring system described above accounts for the number of sentences containing any of the responses outlined. While responses in Categories I and III are counted only once, other responses may be counted twice or three times, according to the number of deviations from perfect repetition they exhibit. For example, a sentence containing both an omission and a substitution is counted under each of the two categories. Any deviation within a sentence is scored only once, regardless of the frequency of its occurrence; e.g., two separate occurrences of omissions within a sentence are recorded as one response containing omissions.

Responses classified as imperfect repetitions have been further analyzed in order to determine (1) the percentage of morphemes each child has been able to repeat among the sentences he has repeated imperfectly; and (2) the number and type of omissions (in terms of words, single words, and markers) found in these responses. Types of single word and marker omissions have been counted.

The results of the sentence repetition test have demonstrated a considerable difference in linguistic development between the two groups of children as a concomitant of varied early experience. By all the standards used in evaluating the comparative performance of the two groups on this test, the Experimental group subjects have shown superior skill in linguistic imitation: not only did they perform more efficiently than the Control group subjects on the single tests; they also manifested a higher and steadier rate of improvement through the twenty-four month testing period. The superior performance of the E group was evident from the beginning: their initial scores (at 36 months) were only equalled by the C group after a year, at 48 months, and their scores at 42 months were comparable to or better than those of the C group at 60 months. Moreover, even their responses classified as imperfect repetitions approximated the test sentences more closely than did those of the C group. This was evidenced by the larger percentage of morphemes repeated by the E group in these responses, as well as by the smaller number of actual deletions they made.

The C group showed improvement within the first 12 months only in terms of a decrease in the number of responses with omissions (see Figure 3.12), in the number of phrase deletions (see Figure 3.13) and the increase in the percentage of morphemes repeated. However, in such performance indices as a decrease in the number of non-repetitions and of single-word omissions (see Figure 3.13) and an increase in the number of exact repetitions (see Figure 3.14), significant improvement was manifested only after 48 months. Moreover, the C Group actually increased the number of their marker omissions (Figure 3.13) and their responses

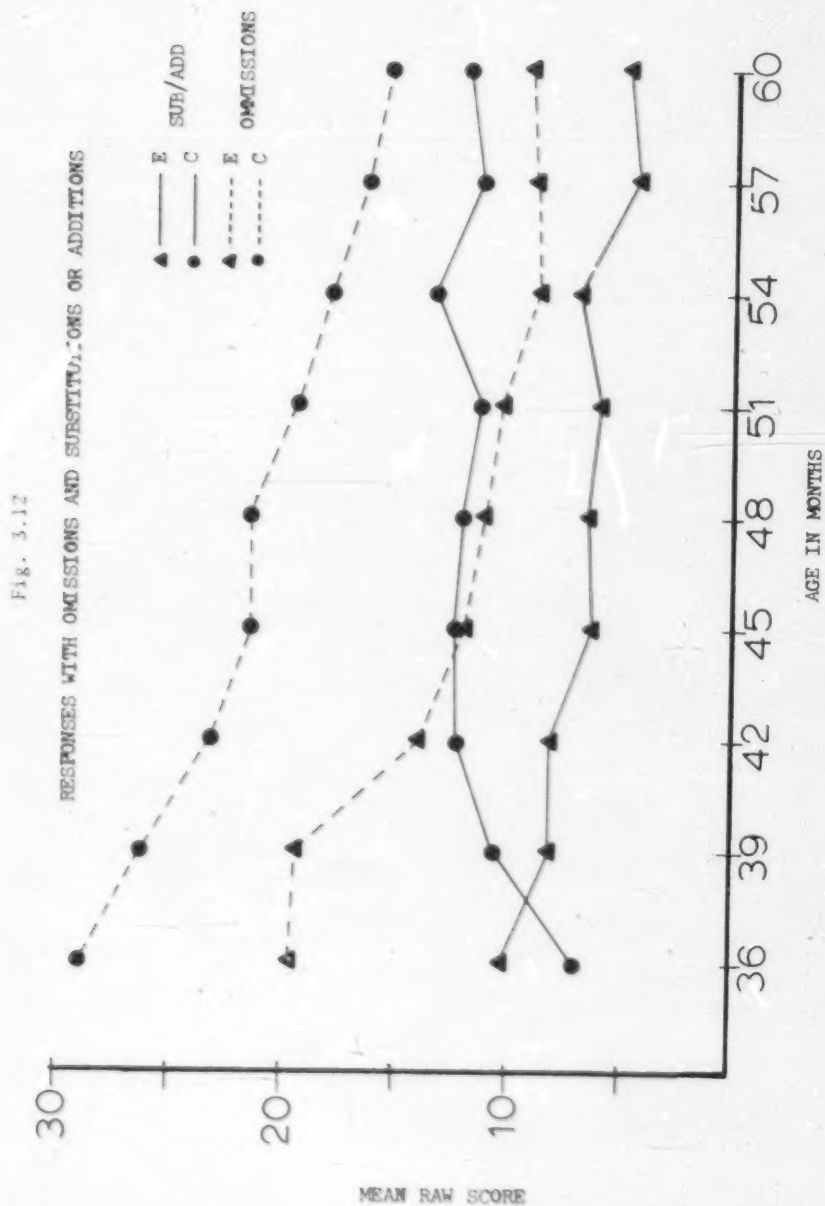


Fig. 3.13
Phrase, Single-Word, And Marker Omissions

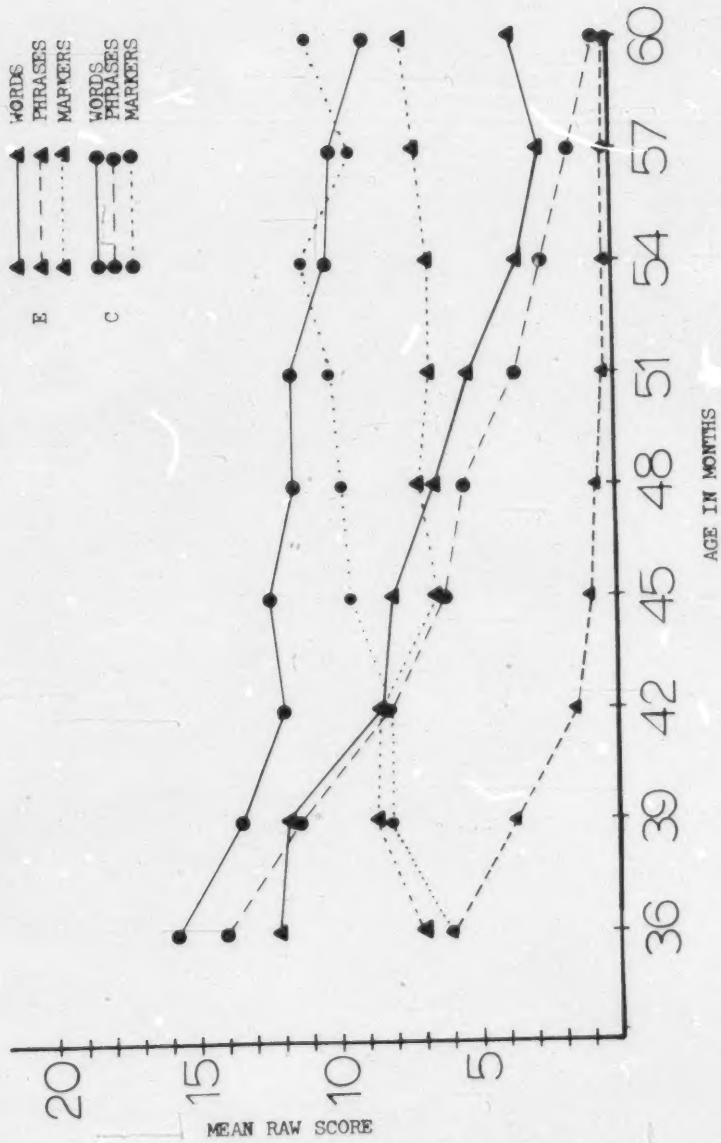


Figure 3.14

PERCENTAGE OF EXACT REPETITIONS



with substitutions (Figure 3.12) during the 24-month period. This increase in the number of responses with substitutions, accompanying the decrease in those with omissions, indicates that the structures that had formerly been omitted were often being replaced by structures other than those of the test sentences. On the other hand, an increase in marker omissions was expected to accompany a decrease in phrase and single-word omissions. This trend, however, was observed only in the C group; in the E group the number of marker omissions remained substantially the same even though there were significant decreases in their phrase and single-word omissions (see Figure 3.13).

While it is difficult to speculate on the process responsible for a child's ability to imitate linguistic structures correctly, the errors that accompany his attempts to reproduce a stimulus furnish some indication as to the limits of his linguistic sophistication. For example, a child who omits only the function words and markers from the test sentence and reproduces it in "telegraphic style" is more likely to have understood the sentence than a child who deletes large chunks and "high-information" words from the stimulus sentence. One reason is that function words, such as articles and auxiliaries, are not only "low-information" words but also occupy unstressed positions in the sentence (Brown and Bellugi, 1964) and, as such, may not have been heard by the child (Slobin and Welsh, 1967). Another reason may be that a child's dialect pattern is interfering with his awareness of the structures in the test sentence. Thus the frequent omission of the verb *be* by both groups in the present study may simply be a reflection of the patterns of the dialect spoken in the neighborhoods in which they have been raised. On the other hand, the omission of phrases and "high-information" words, such as nouns and main verbs, cannot be explained by either of these reasons, and can be regarded as more serious errors than the omission of function words and markers. That the children in the C group consistently omitted more phrases and such words as nouns and main verbs than those in the E group indicates they have not reached the level of linguistic competence manifested by the E group.

The pattern of substitutions generally followed that of omissions. In the last two age levels tested, for instance, the substitutions being made by the children in the E group consisted mainly of function words and markers (e.g. *a* for *the*, *oldest* for *older*, *throwing* for *thrown*), whereas those made by the C group still included nouns and main verbs (*garbage can* for *garbage trucks*, *came* for *became*, *called* for *asked*). The two groups were making these types of substitutions at the same rate during these age levels. Again, it could be inferred that the C group subjects were not as familiar with the structure in which these words occurred as the E group subjects were.

We considered the possibility that Black dialect was responsible for the inferior performance of the C group, but we found no discernible pattern of responses that gave evidence of that effect. Such known dialect features as the omission of *be* and of third-person and plural markers were omitted by both groups with comparable frequency in relation to their total word or marker omissions. The one marker omission that occurred with far greater frequency in the C group

than in the E group was the past tense marker. This single observation, however, does not warrant any assumptions on dialectal influence. Neither were the substitutions or additions attributable to dialect confined to the C group. Certain responses by both groups bore evidence of recoding, such as "Mary got a new baby brother" for "Mary has a new baby brother" (No. 12) and "Mary and Kathy they're girls" for "Mary and Kathy are girls" (No. 11); however, these recodings were also made with comparable frequency by the two groups.

This raises the question of whether a child's ability to repeat linguistic structures is an indication that he also comprehends and can spontaneously produce those structures. Slobin and Welsh (1967) seem to be convinced that this is so, challenging earlier assertions that linguistic imitation is "a perceptual-motor skill not dependent on comprehension" (Fraser, Bellugi, and Brown, 1963). In the present study, instances of responses with substitutions or additions sometimes indicated recall of the deep but not of the surface structure of the sentences. For example, No. 10, "Dump trucks and garbage trucks are real big," was often rendered as "Dump trucks and garbage trucks they're real big." And No. 34, "The man who owns the car washed it," elicited such recodings as "The man washed his car" and "The man who own the car he washed it." Such instances suggest that the child does understand some sentences he is unable to repeat, whether because of interference from another dialect pattern (as in the case of the intrusive pronouns in the responses just cited) or because the structure is too complex for him to reproduce verbatim. While it follows that the child understands some sentences he is able to repeat exactly, it cannot be assumed that his ability to repeat any sentence is proof of his comprehension of that sentence. Evidence has been presented on both sides (cf. Lovell and Dixon, 1967; Menyuk, 1963; Osser, Wang and Zaid, 1969; Nurss and Day, 1971), and it does not seem likely that a definitive answer is forthcoming. It has been generally agreed upon, however, that a child's performance on linguistic imitation tests is a reliable predictor of his performance on tests for comprehension and production (Menyuk, 1963; Fraser, Bellugi and Brown, 1963).

What does seem evident in this study is that greater linguistic imitative skills are a specific indication of a greater degree of general linguistic maturity, influenced to some extent by the child's capacity for immediate recall. The children in the E group not only repeated more sentences exactly but also seemed to have more control of linguistic structures, as the quality of their performance seems to bear out. Their omissions and substitutions occurred mainly on the function-word and marker levels, whereas those made by the C group remained substantially on the phrase and lexical-item levels. Hence even when their responses were incorrect, those made by the E group approximated the test sentences more closely than those of the C group. As they continued taking the test at different age levels, it became evident that there was also a considerable difference in their rates of improvement: on several measures the 48-month level performance of the C group was comparable to the 36-month level performance of the E group, and the 60-month level of the C group to the 42-month level performance of the E group.

Obviously, the participation by the E group in the early stimulation program has contributed to their superior performance in this test and to the greater language facility such performance implies. How their higher level of language development will influence the children's future learning experiences remains to be determined by later observations.

Sentence Repetition Test II

A new Sentence Repetition Test has been given to subjects 60 months and over to check the accuracy and refine the findings of the SR test given to the younger subjects. It has been designed to provide the following controls lacking in the first test:

1. Length. There are 13 six-word, 13 seven-word, and 12 eight-word sentences. (Total = 38 sentences)

2. Complexity. A measure of complexity has been arrived at by counting the number of transformational steps from the kernel (based on the assumption that a kernel sentence is less complex than any of its transformations). Thus a passive is counted as one transformation; a yes/no question without do as one; a yes/no question with do as two transformations; a yes/no with do and wh- as three, and so forth. In addition to these step-by-step transformations, sentences with compounds have been included, since one of the sentences in the last test with which the subjects seemed to have the greatest difficulty contained a compound subject. Sentences with embedded clauses were also included because the only sentence with clause embedding in the last test proved one of the most difficult for the subjects.

The design of the SR II Test is as follows:

Distribution of sentences according to length and complexity

LENGTH (words)	COMPLEXITY					
	Kernel	1-step	2-step	3-step	Compound	2-clause
6	2	2	3*	2	2	2
7	2	2	3*	2	2	2
8	2	2	2	2	2	2

* A sentence with yes/no + does has been added to each of these categories.

Preliminary results for two age levels (60 and 63 months) indicate superior performance on the part of the E group, who gave consistently more correct responses than the C group under the various

categories of sentence length and syntactic complexity. The difference between the two groups was significant at each of the age levels (60 months: $p \leq .005$; 63 months: $p \leq .001$). Sentence length was found to have a significant effect ($p \leq .001$) on the performance of both groups.

A more detailed analysis of the results of Sentence Repetition Test II, including an evaluation of the effect of syntactic complexity on performance, will be presented in a forthcoming paper. Even with the limited data so far available, however, it seems reasonable to predict that sentence length will have a measurable effect on the subject's ability to repeat sentences correctly, and that the difference in performance between the E and C groups will remain considerable. A sampling of sentences from Sentence Repetition Test II is presented below.

Test Sentences from Sentence Repetition Test II:

Practice Sentences

- A. Mary and Fred are going to the movies.
- B. That is the house Jack built.

Test Sentences

- 1. Does the car come down the street?
- 3. What does the dog chase around the block?
- 4. Five cars and four trucks are coming.
- 7. He likes the pictures that he has painted.
- 8. How do cars come down the street?
- 10. I was laughed at this morning.
- 12. They laughed at me this morning.
- 15. I was not laughed at this morning.
- 17. They laughed when I sat down.
- 20. The cars are coming down the street.
- 22. Is the cat being chased by the dog?
- 25. Did you say five cars were coming?
- 26. They looked at me and laughed.
- 27. Who was laughed at this morning?
- 28. The dog chases the cat and the rabbits.
- 34. The dog chases the cat around the block.
- 35. Are the cars coming down the street?
- 38. The cat is being chased by the dog.

Grammatical Comprehension Test

The Bellugi-Klima test of Grammatical Comprehension was chosen to investigate what children understand of the syntax of English. The test is designed to make use of simple physical responses to verbal requests as a means of determining comprehension of syntactic structures. The administration of the test is carefully controlled so that extraneous cues from the situation are minimized. The test items are constructed so that the only way the child can give a correct answer is by comprehension of the particular construction to be tested. The test items are also designed so that the words used are part of the child's vocabulary. The words are known to most children of the age (3-5 years) and unfamiliar words are taught to the child before the actual testing sequence begins (Bellugi-Klima, 1970).

The purpose of the grammatical comprehension test is twofold: 1) to assess the differential development of grammatical comprehension between the experimental group of children and the control group of children; 2) to develop data derived longitudinally on the developmental course of the acquisition of various syntactic features.

Instrument and Procedure: The technique of the test is exemplified by the subtest (Active and Passive Voice Comprehension) presented in Table 3.7.

Table 3.7

SAMPLE SECTION FROM THE GRAMMATICAL COMPREHENSION TEST: COMPREHENSION OF ACTIVE VS. PASSIVE VOICE

<u>Materials</u>	<u>Arrangement</u>	<u>Instructions</u>
Boy and girl dolls; Toy pig and cow	Boy and girl on table, face up	Here is a boy (hold up and replace) and here is a girl (hold up and replace). Here is how we push (hold boy and girl together and push back and forth). 1. Show me: The boy <u>pushes</u> the girl. 2. Show me: The boy is <u>pushed</u> <u>by</u> the girl.
	Pig and cow lying on table	Here is a pig (hold up) and here is a cow (hold up). See, they can chase each other (demonstrate). 3. Show me: The pig <u>chases</u> the cow. 4. Show me: The pig is <u>chased</u> <u>by</u> the cow.

The language examiner, a middle-aged black woman, scores the test as she gives it. A response is either correct or incorrect. If no response is given by the child, the item is scored as incorrect. There are 16 subtests with a total of 61 questions. The entire test can be administered within 25 minutes.

For the moment, consider the passive construction as an example of a syntactic item to be tested. For a valid test of this construction, the following must be considered: 1) Situational cues must be eliminated. Take the sentence: The apple was eaten by the doll. It is a well-formed passive sentence. The child could be asked to act it out and would be provided with an apple and a doll. However, should he perform correctly, it would not be conclusive evidence that he understood the passive construction. He might do exactly the same thing if given the apple and the doll and told, "Do something with these." In their world, children are most likely to eat apples, and not sit on them or some such thing. This, then, would not be a good test as it stands. 2) The child must know the vocabulary used. If the child were asked to act out: "The construction was demolished by the superintendent," a failure to perform correctly would not indicate what he failed to understand, the words or the passive construction. In each case the objects must be known by the child in order to test understanding of syntax only. 3) Minimally contrasting pairs, one containing the construction to be tested, the other not, are needed to ensure that it is the syntactic construction and not some other factor which is comprehended. For passive constructions, the corresponding active sentence is used. Sentences are used in which both the first and second noun can be the subject or object of the verb. The verb push can take an animate subject and an animate object: a boy can push a girl and vice versa. This furnishes the basis for a minimally contrasting pair of sentences, where the passive construction is the only difference: "The boy pushes the girl," and "The boy is pushed by the girl."

A number of significant syntactic constructions are tested in this manner. The test examines comprehension by requiring the children to process the sentence in language-like situations, and act out their understanding of the relationships of parts of a sentence. The Belugi-Klima test of grammatical comprehension contains sixty-one (61) questions in sixteen (16) subtests. The items of syntax measured by the sixteen subtests are: 1) Active vs. Passive Voice; 2) Prepositions; 3) Singular vs. Plural Nouns; 4) Possessives; 5) Negative vs. Affirmative Auxiliary Verbs; 6) Singular vs. Plural Nouns and Verbs; 7) Conjunctions (And/Or); 8) Conjunctions (Either/Neither); 9) Conjunctions and Comparatives; 10) Adjectival Modifiers; 11) Negative Affixes; 12) Reflexive Pronouns; 13) Reflexive vs. Reciprocal Pronouns; 14) Passives: Non-reversible; 15) Comparatives; 16) Self-Embedded Sentences.

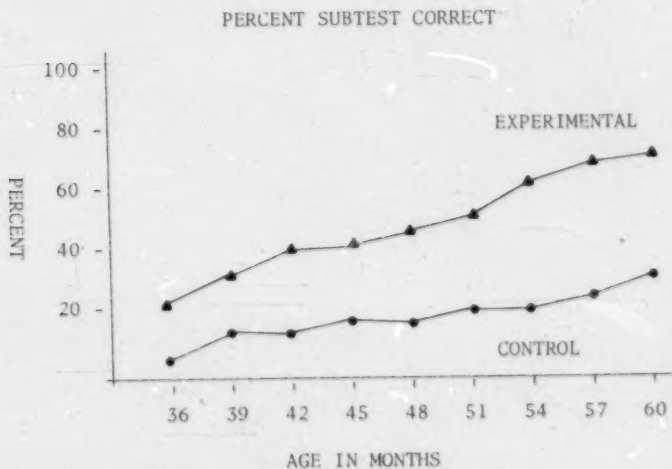
The mean percentage of correct items for the E group at 36 months is 52% correct, and by 60 months above 80% correct. The Controls, on the other hand, succeed on less than a third of the items at 36 months and are performing at a 64% rate at 60 months--a level of

performance accomplished by the E group over a year earlier.

The 61 items of the GC test are organized into 16 subtests, each subtest being designed to test comprehension of a single grammatical construction. In Figure 3.15 the mean percentage of subtest correct for both the E and C groups from 36-60 months are presented.

This measure of subtests correct gives an indication of the grammatical constructions the children are able to perform on the GC test. In comparison to the number of items correct, the more subtests a child performs correctly, the more grammatical categories he can be said to command, and the more developed is the organization of his grammatical system. The Experimental group at 36 months performs correctly 21% of the subtests as compared to 7% by the Controls. At the 60 month age level the Experimental group performs 69% of the subtests correctly while the Controls' performance at the 57 and 60 months levels is only comparable to the Experimental's test performance two years earlier.

Figure 3.15



These results clearly demonstrate that the Experimental group comprehends more syntactic items than does the Control group. This is shown by the Experimentals having successfully performed more individual items as well as more subtests, and usually so at an earlier age. A clearer perspective of the longitudinal acquisition of the various features can be obtained by an examination of both groups' performances on the individual subtests. A subtest was considered "acquired" when 65% of the group performed the subtest correctly and maintained this level of performance for at least two consecutive age periods.

If we divide the entire test span into 3 periods, Early -- 36 through 42 months; Middle -- 45 through 51 months; and Late -- 54 through 60 months we can suggest developmental trends.

The Experimental group acquired the following subtests during the Early age period: 2) Prepositions (75% at 42 mos.), 3) Singular and Plural Nouns (100% at 39 mos.), 4) Possessives (100% at 39 mos.), 5) Negative and Affirmative Auxiliary Verbs (78% at 39 mos.), 7) Conjunctions (And/Or) (68% at 36 mos.), and 11) Negative Affixes (65% at 42 mos.). The Controls only perform equally well in subtest 3 for Singular and Plural Nouns (86% at 39 mos.).

The following features are acquired by the E group during the Middle age period: 1) Active vs. Passive Verbs (65% at 48 mos.), 10) Adjectival Modifiers (82% at 45 mos.), 12) Reflexive Pronouns (78% at 45 mos.), 13) Reflexive vs. Reciprocal Pronouns (85% at 48 mos.) and 15) Comparatives (73% at 45 mos.). The Control group acquired Subtest 15 during the Middle period (67% at 51 mos.). The Experimental group has not acquired additional subtests by age 60 months, but the Control group has added subtests 12) Reflexive pronouns (92% at 60 mos.) and 13) Reflexive vs. Reciprocal Pronouns (83% at 60 mos.).

Subtest 6) Singular vs. Plural Verbs, 8) Conjunctions (Either/Neither), 9) Conjunctions and Comparatives, 14) Passive Verbs: Non-reversible, and 16) Embedded Sentences were not acquired by either group.

An examination of the subtests acquired during the Early age period would seem to indicate that the first linguistic features learned by the children are the markers and affixes. Plurality (Subtest 3) is marked by an "s", as is possession (Subtest 4). The contraction *n't* (Subtest 5) might be perceived by the children as an affix, similar to *un* (Subtest 11). During this age period the E children also acquire the distinction between *in*, *on*, and *under* as well as *and/or*, suggesting the early acquisition of function words.

During the Middle age period the E children acquire comparatives (Subtest 15) marked by *er* and the single word *more*. With this one exception all the other subtests acquired in this period deal with high-content words (Active/Passive Verbs, Modifiers, and Pronouns).

Those subtests not acquired are the most complex constructions, i.e. they involve more than one grammatical concept (Singular/Plural Verbs, *Either/Neither*, Non-reversible Passives, and Embedded Sentences).

The advanced position of the Experimental group relative to the Control group is consonant with the result of our other tests of language development. The Controls' poor performance on the Grammatical Comprehension Test does not seem to be due to dialectal interference but to a generally poorer grammatical comprehension. The considerably more successful performance of the Experimental children, on the other hand, demonstrated that they have the

ability necessary to process grammatically complex commands. There has been no special curriculum used in the Milwaukee Project designed specifically to change the children's dialect usages.

All of the children came from primarily Negro neighborhoods in the inner-city of Milwaukee. In such areas, cultural influences produce a dialect spoken by most members of the cultural group. Typically, Black dialect within an area is essentially uniform and differs markedly from Standard English (Entwisle, 1968; Loban, 1964; and Stewart, 1965). Indeed, if a child has acquired the majority of the syntactic patterns of a non-Standard dialect then he would be expected to have some difficulty in scoring well on the Grammatical Comprehension test, precisely because the grammatical comprehension test measures the patterns acquired in the Standard dialect. There is, of course, no test for a non-Standard dialect; there is not even a complete description of the Northern urban Black dialect (Wolf et al., bibliography, 1971). Therefore, it is difficult, to say the least, to evaluate the effects of Black dialect on the results. Both the Experimental and Control children as well as the language tester and some of their teachers speak Black Dialect, and both groups have been exposed to Standard Dialect through radio and television programs. The Experimental children, however, are further acquainted with Standard Dialect spoken by some of their teachers. This closer acquaintance with Standard Dialect is of a special nature since it required active communication from the children compared to the passive exposure associated with radio and television. It may not be so much the Controls' lack of acquaintance with Standard Dialect but their lack of experience in active communication--a factor which is not to be taken lightly--that accounts for their poor performance. Early experience of this sort in language behavior has profound implications for the development of the higher processes of thought.

In addition to the free speech analysis and the specific language tests, the Illinois Test of Psycholinguistic Abilities (ITPA) was administered to all of the children who had reached 4-1/2 years; 18 E's, and 18 C's. The ITPA was devised by Kirk and McCarthy (1961, revised 1968) to measure various encoding and decoding abilities of early linguistic behavior. The ITPA model evaluates these abilities through measurement of the interactions of three effects on that behavior: (1) level of organization, (2) psycholinguistic process, and (3) channels of communication. The two levels of organization are the representational and the automatic. The former subsumes those processes which require a high degree of voluntary activity, while the latter includes the more habitual and mechanized processes of arranging and reproducing linguistic phenomena. There are three processes: the receptive, the expressive, and the organizational. These respectively include the abilities to: (1) recognize and understand phenomena, (2) express concepts synthesized from that understanding, and (3) internally manipulate those concepts. The visual-motor and auditory-vocal channels used in the test relate

to routes of communication. Though it is theoretically possible to postulate many such channels, the ITPA restricts its observation to the auditory-vocal and visual-motor channels. The design of the ITPA is such that each of the subtests measures on process through one channel at one level of organization.

For both the E and C groups the following data were calculated:

(1) mean scaled score (MSS): The MSS is derived by averaging the scaled scores of all the subjects in a particular group. Scaled scores for individuals are derived according to the tables in the examiner's manual by adjusting the raw scores of each of the subtests to eliminate age as a factor.

(2) psycholinguistic age (PLA): The group PLA is derived by averaging the individual PLA's for all members of the group. The individual PLA represents the level of overall linguistic skill attained by the child. Comparing PLA with the chronological age (CA) shows whether the child is above or below average.

(3) psycholinguistic quotient (PLQ): The PLQ for a group is derived by dividing the PLA by the CA and multiplying the result by 100. In terms of linguistic ability, the PLQ is comparable to an IQ.

The means for each of the measures derived for each group (E and C) may be found in Table 3.8.

Table 3.8

RESULTS OF E AND C GROUPS PERFORMANCE ON THE ITPA

	Mean CA	Mean PLA	MSS	PLQ
Experimental	4-7	5-3	41.7	114.1
Control	4-7	3-10	32.3	84.0
Difference		1-5	9.4	30.1

An examination of the means indicates that the children in the Experimental group appear to have a much higher degree of linguistic sophistication than those in the Control group. In terms of psycholinguistic ability as measured by the test, the E group is performing almost a year and a half ahead of the Controls. This difference is reflected in the 30 point discrepancy in the PLQ score in favor of the E group. The Experimentals are performing, on the average, eight months above their mean CA, while the Controls are nine months behind their mean CA.

The data presented in Table 3.9 are the scaled scores for both the E and C groups on each of the ten main subtests of the ITPA, and the difference between each group on each of these subtests. Figure 3.16 illustrates the performance of each group on each subtest and their performance in relation to the group's

mean scaled score. It is obvious from the difference listed in Table 3.9 and the graph of the scaled scores in Figure 3.16 that the Experimental group performed better than the C group on every single subtest. The greatest discrepancy in performance appeared on the tests for Grammatic Closure and Visual Closure (respectively, 13.7 and 11.7) and the least difference on the tests for Manual Expression and Auditory Sequential Memory (respectively, 5.7 and 7.5).

Table 3.9

RESULTS OF EACH GROUP'S PERFORMANCE ON THE SUBTESTS OF THE ITPA

	E	C	diff.
Auditory Recpt.	36.8	28.8	+8.0
Visual Recpt.	46.1	37.8	+8.3
Auditory Assc.	40.7	29.4	+11.3
Visual Assc.	41.1	31.8	+9.3
Verbal Exp.	42.3	34.4	+7.0
Manual Exp.	43.9	38.2	+5.7
Grammatic Clos.	42.4	28.7	+13.7
Visual Clos.	43.5	31.8	+11.7
Auditory Sequen.	40.6	33.1	+7.5
Visual Sequen.	39.9	29.3	+10.6

By using the grid in the upper part of Figure 3.16, one can compare the performance of each group on the auditory-vocal and visual-motor channels for each process at each level. Except for the subtests for sequential memory, both groups scored higher on tests involving the visual-motor channel than they did on tests in the auditory-vocal channel.

Table 3.10 specifically indicates these differences. On tests in the auditory-vocal channel, the Experimentals functioned 2.3 points less well than they did on similar tests in the visual-motor channel. The difference for the Controls was 3.4. When the tests for sequential memory are removed from consideration, the differences widen to 3.3 (E) and 4.1 (C).

Table 3.10

RESULTS OF EACH GROUP'S PERFORMANCE ON AUDITORY-VOCAL SUBTESTS AS COMPARED WITH VISUAL-MOTOR SUBTESTS OF THE ITPA

	Experimental	Control
Auditory-Vocal	40.6	30.3
Visual-Motor	42.9	33.7
Auditory-Vocal	40.5	30.8
(Minus tests for sequential memory)		
Visual Motor	43.8	34.9
(Minus tests for sequential memory)		

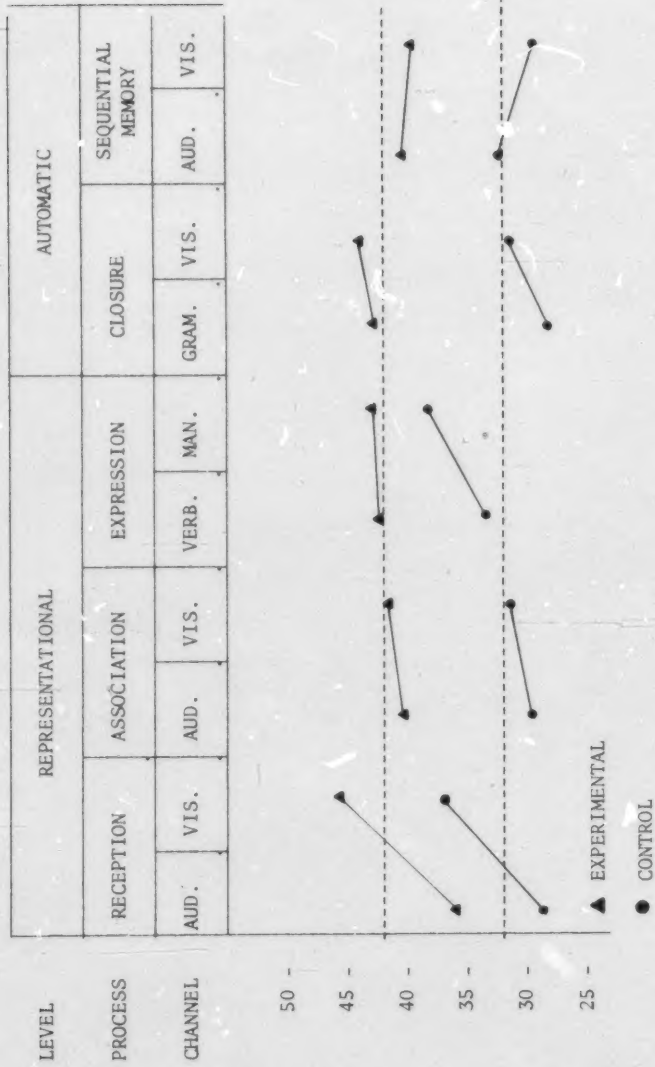
Clearly, the Experimental group's performance is superior to the Control groups across all of the subtests of the ITPA. Indeed, one must assume that the early intervention program has increased their linguistic proficiency in skills measured by the test. The intervention program places considerable emphasis on verbal expressive behavior and appears to have a positive influence on language development in disadvantaged children. It remains to be seen, however, whether the high scores obtained by the Experimentals on the ITPA will actually predict future proficiency in their learning of reading and other language skills.

Secondly, the high scores obtained by the Experimentals may not be much higher than the average scores for the population as a whole. If we measure the mean scaled score of the Experimentals against the mean of the normative group (36 with a standard deviation of 6), it would seem that the Experimentals are functioning with extremely high linguistic proficiency and that the Controls are inside the boundary the designers of the test set to indicate functional retardation. In making such a comparison, however, one should keep in mind that national IQ's are rising (Severson and Guest, 1970) and that recent use of the ITPA has reported scores generally higher than those previously thought to be in the normal range (Whitcraft, 1971). It would appear, therefore, that in terms of psycholinguistic abilities in the general population, the Controls are functioning with less ability than the figures would suggest and the Experimentals are functioning close to average.

Finally, the composite scores MSS, PLA, and PLQ do not give an accurate reflection of the diverse performances within and between the groups reflected on the individual subtests. The two most important generalizations generated by an examination of the subtest results are (1) that the Experimentals have to some extent gained proficiency in Standard English as a result of the intervention program, and (2) the ITPA may be, on some subtests, weighted in favor of speakers of Standard English and against speakers of at least some varieties of non-Standard English, in this case, Black English.

A comparison of some of the results of the Whitcraft (1971) study indicates that some major differences in ITPA subtest scores between her standard speakers of English and non-standard speakers are approximately the same as the differences between the Experimentals and Controls in this study. However, this comparison does not necessarily lead to the suggestion that the Experimentals have become fully bi-dialectal. It is unfair to assume so from the ITPA results since the Controls have had considerable exposure to Standard English through radio and television. It is fair, however, to assume that, because the Experimental's daily environment contains speakers of both Standard and non-Standard English as well as television, in order to gain facility in Standard English, it is probably necessary for children to communicate actively with Standard English speakers; communication that goes beyond the passive entertainment of television.

Figure 3.16
ITPA SUBTEST RESULTS



The results of the subtest scores also indicate that both the Experimentals and the Controls do more poorly, relative to their group mean scores, on tests requiring use of the auditory vocal channel. The data in Table 3.9 fairly clearly indicates that the Experimentals and Controls do better on tests in the visual motor channel. Perhaps it may be unwarranted to attribute the higher scores on the visual motor channel to any single factor, genetic or environmental (Kirk, 1972), but the bulk of evidence gathered in this paper tends to suggest that, were the ITPA not predicated on Standard English as a normative medium, the children in both groups would have higher scores.

Nevertheless, in measuring the success of the intervention program, the subtest results clearly indicate that the Experimentals score consistently higher, even on tests in the auditory vocal channel. The discrepancies found in both groups between performance on the auditory vocal channel compared to the visual motor channel would not significantly diminish the conclusions revealed by the general pattern of results: principally, that the intervention program has facilitated the language performance of the Experimentals to the extent of a 30-point PLQ difference over the Controls. Only by future testing of these children will we be able to discover if the wide differences in linguistic skills between the Experimentals and Controls in this study predict corresponding differences in the acquisition of reading and other language skills. Future tests will be valuable not only in assessing the progress of both groups, but also in further evaluating the ITPA as a measurement of psycholinguistic skill.

Summary of Language Development

We have discussed the language instruments designed to test a child's performance in each of the three areas; imitation, comprehension and production. The results from all of the measures indicate that the children in the Experimental group have greater language facility in these areas. The earliest measure used is that of gross feature tabulation of free speech. The results of these measures show that in the crucial period of rapid language growth (from 18 to 35 months) the Experimental children lead the Control children in the entire area of speech production--they use more lexical items in more utterances. This does not mean, of course, that the children of the Control group are unable to speak; on the contrary, by the age of three the Control children are using as many utterances as the Experimentals. Near the age of three, however, the free speech measures' sensitivity diminish as a measure of differential development. Thereafter it is necessary to turn to the results of more structured tests to monitor the development of the two groups.

The children's imitative abilities are measured by the Sentence Repetition Test. The results indicate the Experimental group's superiority on this task, **both in the number of sentences** they are able to repeat correctly and in the kinds of errors they make when unable to repeat exactly. After the first year of testing

the Control group is only able to approximate the Experimental group performance of a year before, and after two years of testing, the Control group performance is one and a half years behind.

The children's comprehension is measured by the Grammatical Comprehension Test. On this measure, the Control children do not approximate the Experimental children's performance at 36 months until they reach 56 months, a delay of a year and a half. When the test is analysed by subtest, the Experimental children were shown to have acquired 11 subtests by five years old, while the Control children had only acquired 4 subtests.

The Illinois Test of Psycholinguistic Abilities (ITPA) was used as a standardized instrument to complement the other language tests. On this measure, dialect was also a factor, but the E group still evidences superior linguistic skill; they have a 30.1 point higher PLQ than the C group. The E group scores fall within the normal range on the ITPA scale, while the C group tests fall below normal.

These results on the language measures indicate that the intervention program has had a profound effect on the Experimental group's ability to perform on structured tests of linguistic development. In comparison with the Control group, the Experimental group scores higher on all of our measures and on the standardized ITPA. The differences between the groups are often a year to a year and a half.

SUMMARY OF PRESENT DATA

As a way of summarizing performance of Experimental and Control groups, to date, we have transformed a number of our developmental measures to $\bar{z}$ scores and placed them on the same axis. This procedure facilitates an overview of the differential development of the two groups of children. Figure 3.17 has plotted 3 types of measures taken between 36-66 months: 1) IQ tests; 2) language measures; and 3) learning measures. These points reflect development over the most stable period for both groups in their performance and in our assessment procedures.

At thirty-six months, there is a thirty point difference in mean IQ performance in the two groups, at forty-eight months there is a thirty-one point difference, and at 60 months, where we have complete scores, there is a twenty-six point difference between the groups. At 66 months, the oldest data point for which we now have essentially complete data shows (13 of 18 Controls with 5 remaining to reach 66 months; and 15 of 17 Experimentals, 3 are lost and 2 remain to reach 66 months) an IQ difference of 30 points. This performance is reflected in the remarkable $\bar{z}$ score deviations from the group mean performance baseline. Moreover, the deviations from the $\bar{z}$ scores do not overlap in range, which supports the strength of the discrepancies in the IQ performance of the two groups. At 48 months we administered the WPPSI and although the mean IQ scores are lower on this test than from the Stanford-Binet (S-B) tests (as we pointed out earlier) there is a remarkable consistency to the differential performance of the two groups. This is demonstrated by comparison of the $\bar{z}$ score values on the S-B at 36, 48, 54, 60 and 66 months for the E and C groups: $\bar{z}_{E,36} = .75$ vs $\bar{z}_{C,36} = -.93$; $\bar{z}_{E,48} = .82$ vs $\bar{z}_{C,48} = -.92$; $\bar{z}_{E,54} = .85$ vs $\bar{z}_{C,54} = -.85$; $\bar{z}_{E,60} = .80$ vs $\bar{z}_{C,60} = -.80$; $\bar{z}_{E,66} = .80$ vs $\bar{z}_{C,66} = -.93$; and for the WPPSI scores at 51 months, $\bar{z}_E = .76$ vs $\bar{z}_C = -.89$, and at 57 months, $\bar{z}_E = .89$ vs $\bar{z}_C = -.83$, and at 63 months, $\bar{z}_E = .81$ vs $\bar{z}_C = -.74$.

These data on the standardized tests of measured intelligence summarize the present differential development between the Experimental and Control groups. The dotted line in Fig. 3.3 represented the mean IQ's of offspring of mothers with IQ's below 75, taken from our original population survey. It depicts the pattern of development expected for our actual Control group. You will recall that our hypothesis was in terms of preventing the relative decline in development of the Experimental group which we saw in Fig. 3.3 for the contrast group and which we can begin to see in the Control group in Fig. 3.18. In sharp contrast is the Experimental group's performance, to date, on the standardized tests of measured intelligence, indicating a remarkable acceleration of intellectual development on the part of these children exposed to the infant stimulation program. Further, their performance is quite homogeneous as contrasted with that of the Control group where less than one-fourth of the Ss test at or above the norms with the remainder trending toward sub-average performance. In fact, of those 4 Controls who have scored over 100 on the S-B at 48 months or older, all four are represented at 60 months where the data is complete (IQ

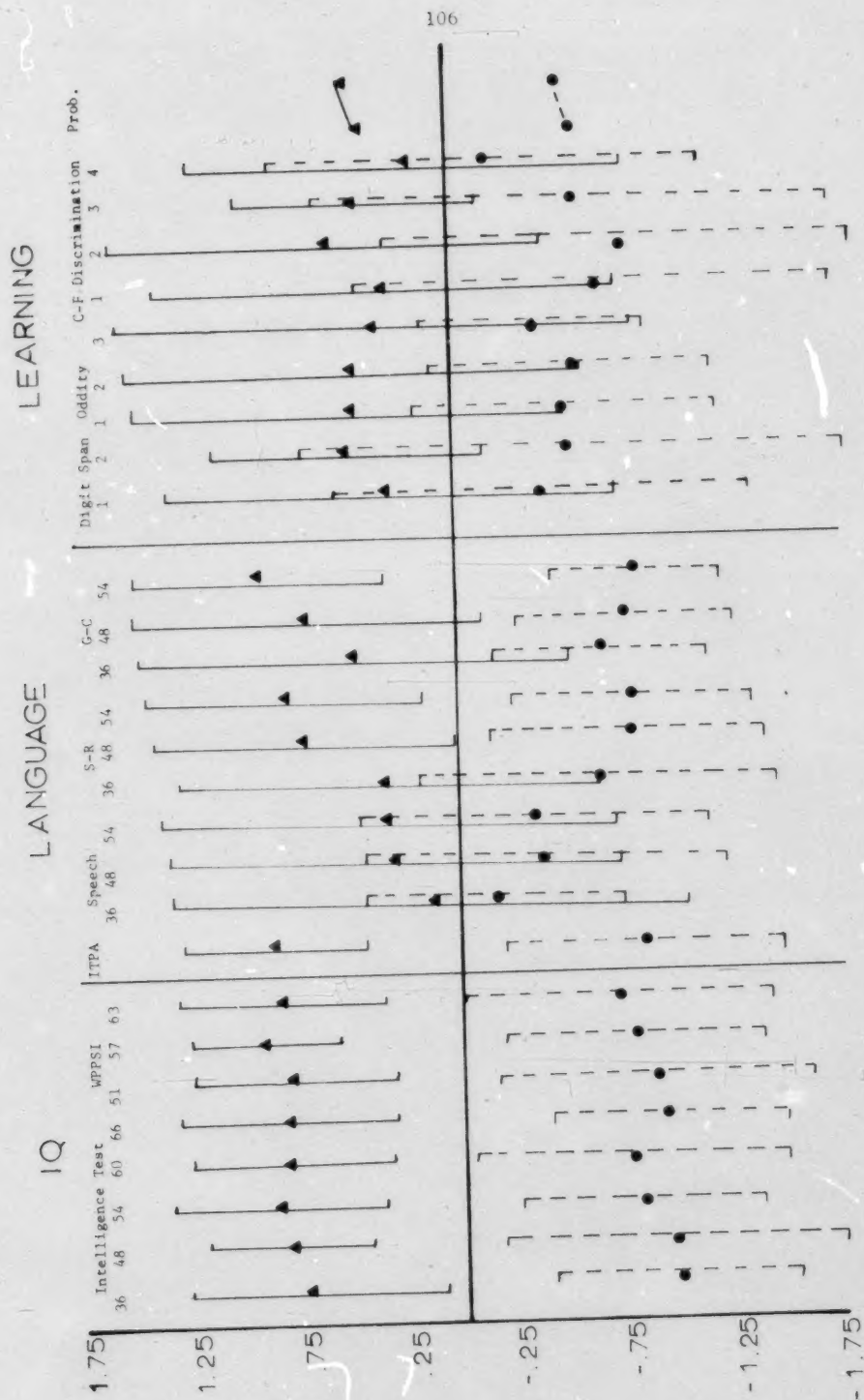
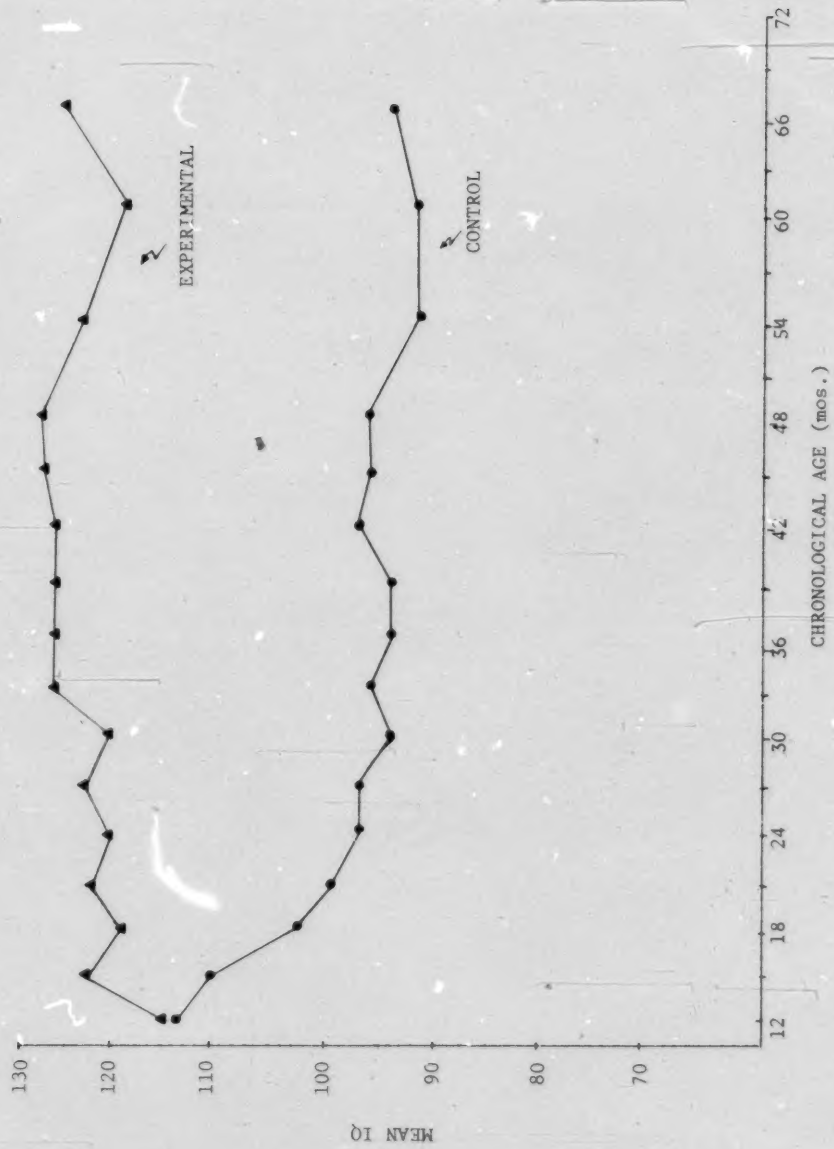


Fig. 3-17. Composite of Transformed Developmental Measures from 36 Months

Fig. 3.18 Mean IQ Performance with Increasing Age For the Experimental and Control Groups

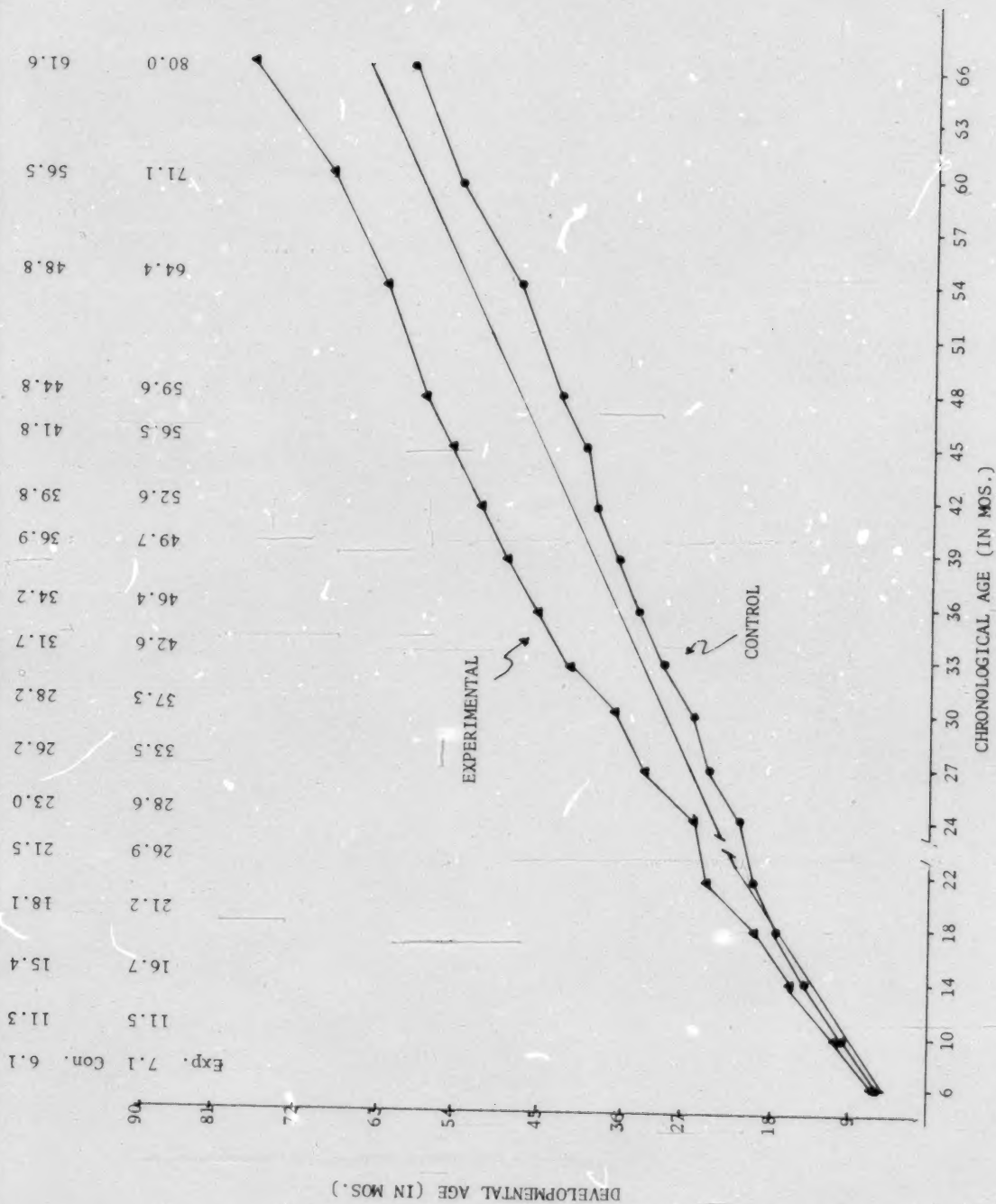


mean is 91.7) and all four are represented at 66 months where the data is incomplete (IQ mean = 94), suggesting that the mean at 66 months will reduce somewhat since the highest scorers are already included and the 60 months mean of the 5 yet to be added is 80.

Although there is more variability in both the learning and language measures than on IQ performance, and less in language than in learning, there is an obvious consistency across all performance measures suggesting a stable, continued differential development -- in favor of the Experimental children. In fact, the data in Figure 3.17, which is a plot of the mental age scores in deviation form, through the entire course of development, underscore not only the highly remarkable consistency in the differential intellectual development between the two groups of children, in favor of the Experimental children, but the fact that since the three year mark there has been maintained at least a one full year (12 months or more in MA) intellectual advantage for the Experimental children over the Control children. At 36 months the Experimentals were 10 months in advance of growth norms while the Controls were two months below. From 36 to 66 months the Experimentals range from 10 to 14 months above the average, while the Controls on the other hand continue to slowly decline at each age point from 24 to 66 months. At 24 months they are minus one month; at 36 months they are minus two; at 48 months, they are minus three; and at 60 months they are 3 1/2 months below the line of average growth. At 66 months the Experimental group is 1 1/2 years ahead in mental age, with the Control group being 4 1/2 months below average growth.

The present data in all areas of performance measured, clearly indicates a marked superiority for the Experimental group. However, interpretations of, and generalizations based upon present data must be tempered by recognition of the test sophistication which has obviously been acquired and by knowledge of previous enrichment studies where treatment gains (particularly in tested IQs) have not tended to be maintained over long post-treatment periods. As stated in the initial design description, independent, comprehensive behavioral evaluations conducted at age seven (a year beyond the termination of intervention) were seen as a reasonable basis for evaluation of effects of intervention. This is not to suggest that subsequent changes in relative performance levels would not occur beyond that level but, rather, it would provide a somewhat solid basis for evaluation of the treatment effects. Any ultimate evaluation, of course, must be based on the performance of these children as they move through the educational system.

Fig. 3.19 Mean developmental functions for the Experimental and Control Groups in comparison to an Average Growth Function



APPENDIXES

- I. FAMILY PORTRAITS
- II. INFANCY
- III. LANGUAGE PROGRAM
- IV. READING
 - A. READING PROGRAM
 - B. READING ACTIVITIES
- V. MATH/PROBLEM SOLVING
 - A. MATH/PROBLEM SOLVING PROGRAM
 - B. MATH/PROBLEM SOLVING ACTIVITIES
- VI. MATERIALS

APPENDIX I
FAMILY PORTRAITS

APPENDIX I

FAMILY PORTRAITS

by

Gretchen Schott

FOREWORD

The anecdotal descriptions presented here attempt to characterize the family in a way that cannot be communicated by survey and test statistics, numerical profiles or the other research techniques that tend to take the human out of human research. The selection of the children described in these "portraits" was determined by several factors. Obviously each child is unique, as is his family situation, yet certain circumstances of family structure or, of interplay between members of the family, could be considered "typical" enough to be representative. In all cases selected, the mothers are fairly open and communicate relatively freely. In order to keep the portraits as value-free and judgement free as possible, we chose a single parameter, Care for the Child, i.e., the broadest spectrum from observable child neglect at the lower end of the scale to conscientious, consistent parental care and concern at the upper end of the scale. Since about one-third of the mothers in the project are operating households which have no male in the household, a factor which in itself affects family structure, we chose one mother who had managed to create an orderly cohesive household by herself and one mother whose household was marked by a total lack of cohesiveness and order. In addition, we also chose one family in which there was a male present in the household and from which two children were involved in the project. These descriptions were prepared by Gretchen Schott, journalist, at our request. She has no other affiliation with this project and was selected as a neutral observer and interviewer previously unknown to the families interviewed.

The Portraits

Robby, now 4 1/2 and in the project since its beginning, comes from a home which every staff member identifies as the lowest end of the spectrum in care for the child. Nutrition, proper clothing, and health care are frequently inadequate; Robby is often sent to school when he is sick. Teachers have noted that he is frequently most irritable and difficult to manage on Mondays, after having spent an entire weekend at home, partly from the chaos of the household, partly from sheer fatigue.

Even a casual visitor is likely to notice Robby as being somehow different from other children in the project. On a cold day, he may appear at school with no socks, a short-sleeved cotton shirt or no jacket. The project has done its best to compensate for this kind of obvious neglect; it is significant that Robby is the only child for whom they have bought clothes. But whether the clothes are found and put on him is completely hit-and-miss. It is typical that when his mother is called and asked, "Why did Robby wear shorts today, when it's so cold?" his mother will answer, "He didn't find anything else to put on, I guess." She never construes such a question as being aimed at her negligence, but rather as a somehow disconnected comment about Robby; as a consequence, the staff has learned not to expect improvement on the next cold day, but rather to hope, for Robby's sake, that things will be better. Moreover, since the project provides two meals a day for the children, Robby is spared consistent nutritional deprivation of the sort that his brothers and sisters have.

Not only is Robby identifiably different in appearance, but in manner. Until recently, his movement and walk were those of a child about a year younger than his chronological age. The immaturity in motor skills was matched by immature social development and a marked sense of insecurity. He needs and demands a great deal of individual attention. Staff members recall that when his baby sister was born five months ago and his mother was hospitalized, he felt even more lost. Since the birth of Marcy, Robby has rapidly picked up in maturation. He looks, moves, and acts more like children his own age, perhaps because he is no longer the baby in his own family.

In spite of these rather dramatic differences in Robby, he has of late made some important breakthroughs. Within the last month he has learned to write his own name and one can see the joyous evidence of discovering one's own identity in his drawings. For several days, the only art work he produced was his own name, written over and over in giant splashy colors. A single sheet may have ten Robby inscriptions in vivid red, blue, yellow, and green. From this he proceeded to drawings of his family, each figure constructed using a capital R; there are groups and clusters of people in these drawings, each with the top look of the R for a head and the legs of the R for body and feet.

In spite of Robby's immaturity of physical movement, he has, from the beginning been well-coordinated in certain respects. He was able, at 18 months, to get in and out of the stroller unassisted. He is now able to roller skate and was one of the first children in the project to learn to use a tricycle. He loves "motor games", pretending that he is the driver of a car, or even better a big truck, and evinces the same exuberance that he did on the day when he was first able to shout, over and over, "I wrote my name, I wrote my name!" And those motor games are never silent affairs; he rumbles and gurgles motor sounds, steers imaginary steering wheels wildly, and often wears the nearest handy hat, set at a jaunty angle.

Much of the early work in math and verbal skills was done with Robby on an individual basis. There were several reasons for this. When he was able to fit into a group situation, he was allowed to do so, though more often than not his presence prevented other children from working and he was best instructed by himself. Care was taken to place him in a group, usually younger than he, where he was assured of some success. Each of the teachers involved with Robby at this stage of his development remained true to herself and to her own best teaching method. When Robby's psychological disturbances got in the way of the educational process itself, each teacher sought ways to make him an acceptable member of the group rather than to change the group to fit him.

When Robby began in Becky's math program, he spent his time lying on the floor, sucking his thumb or saying, "I want to go home." If she approached him or spoke to him, he would turn away silently or make no response. When he sat, he sat curled in upon himself clutching himself with his arms in a "containment posture." To counteract this behavior, Becky embarked on a program of behavioral conditioning with him. The conditioning took the form of a kind of contract. Robby was allowed to choose something he wanted very much -- it turned out to be a cowboy hat. The hat was purchased and placed in a cabinet. Robby's part of the bargain required acceptable behavior on his part. For each math session that he spent without crying or sulking, he was to earn a token, a plastic chip. The price of the cowboy hat was twenty chips which he also had to be able to count. Robby accepted the bargain, although during the earning of the chips, he asked almost daily to see the hat to assure himself it was still there. At the conclusion of the contract Robby had not only mended his behavior through twenty math classes, but could count to twenty and was the proud possessor of a new cowboy hat. Interestingly enough, he gradually began to focus more on earning the chip for its own sake than for the prize it would garner.

Robby's training in verbal skills, was of a different order. Because it was pedagogically natural for her to handle him in this manner, the teacher chose to ignore his tantrums entirely. She gave him praise whenever he joined in or was productive and made a special effort to show the other children his work or to let him show it himself. She instructed the other children to ignore him when he had a tantrum and ignored him herself. She coupled this technique with a transfer of responsibility to Robby saying, "When you're ready to come and sit with us you can." Sometimes Robby chose to sit silently or uncooperatively until suddenly a question that caught his attention or interest was asked; then in spite of himself, he would chime in. Jerri, his Reading Readiness teacher, also chose to ignore him entirely as did the other two children in his group. He was paid attention to and included only when he was reading.

Some of the teachers who now teach Robby agree that his moods and tantrums were in part a function of trouble traceable to his home life and to fatigue, and in part, attention-getting devices to compensate for his insecurity. They also agree that Robby is fully

aware that behavior manipulation is a two-way street, and that whenever a real opportunity to manipulate a teacher presents itself, he will take advantage of it. Becky notes, for example, that during the cowboy hat-chip contract, Robby would dawdle, and a time limit on his "successful" class days had to be set.

A visit, on a typical day, to Robby's home tells its own story. The day is about ten below zero and a soft snow is falling. A knock at the door brings four curious children to peer out, each taking his turn at the glass smeared to opaqueness with fingermarks and exploring tongues. As we step into the living room we see Robby's mother, Mary Anderson, standing in the center of a bedlam of children and noise, lackadaisically wielding a broom. Her cleaning efforts tell us why we were delayed at the door; she needs to create an open space for extra people to walk and sit down. The pretense of cleaning is sustained for perhaps two or three minutes, and then abandoned -- a pile of single shoes, broken toys, crumpled disposable diapers, paper and dirt is left standing and the broom is gently rested against the nearest wall. So far, Mary has not spoken to us but shyly recognizes our presence with a smile.

Very little connected conversation is possible in this household. Four of Mary's five children are in the room as well as two other children, about six or seven, who are "visiting." Their games are raucous and vigorous. Bobbie Lee, Robby's five month old baby sister, is passed from one child to another. She chokes momentarily and is held upside down by a six year old girl, apparently to help her choking. Her infant eyes look dazed; she gazes first at the droning television and then from one place to another trying to find sources of the voices and noise. As we sit on the tattered sofa, Mary shows us her latest purchase, an artificial fingernail lengthener-strengthener. She is puzzled by the mixing instructions for two kinds of glue and by a plastic fingerguard to be used during the application. Though she watches intently while we try to show her how to use it, she finishes by laying it aside, saying, "It's better than biting your nails, but I guess I just spent three dollars on somethin' I can't use."

Mary Anderson is much overweight, but because she is about 25, the vestiges of what was once a lovely figure are still there though ravaged by child bearing and poor nutrition. Her once-pretty face still has a certain softness and a gentle smile marred by a missing front tooth. In spite of everything, there is about her an essential and basic femininity. She is wearing high heels with slacks, a disheveled, but lacy pink blouse and an attractively styled wig; like everything else here, disorder and dirt take their toll. The slacks are stained, the shoes run over, the wig pushed askew by climbing children who crawl along the back of the sofa, pushing their faces toward us asking, "Hah od ah ya?" After three tries we figure out the question, "How old are you?"

An account of even a short time spent with Mary and her family is of necessity, kaleidoscopic. No child does anything for very long,

nor listens much to what is being said by others. Mary is socially aware enough to sit and "visit;" her face lights up when I ask her about her pool game. She is a champion pool shooter, belongs to the Great Northern league, and smiles widely and with true pleasure when she says, "I just love eight ball. Nine ball's okay, but eight ball's my best. Tommy, get my stick. Who took my stick?" She gets up to search for the missing pool cue, muttering "Teddy's got it, Teddy uses my stick more than me (Teddy is her nine year old), you know Teddy shoots real good, he spends most of his days shooting." When she locates the pool cue, in the cluttered closet, she carefully takes it from its leather case. It is a fine, obviously beloved, Minnesota Fats cue which can be disassembled and placed in a carrying case.

When we ask her about Robby and about school, she seems pleased. "Oh he was real fun when he was a baby, and he talks real good now -- no stuttering. And he knows his ABC's and his name -- Tommy, she don't even know her ABC's but Robby does." (Tommy is about two or three years older than Robby and speaks so thickly she is almost unintelligible.) Mary continues, "Robby don't like it when there's no school; he keeps saying, 'You better call, Mom, maybe something happened, you better call' -- he won't leave me alone." Robby has been kept home on the day of our visit and has been taken to the doctor by Mary and her current man (Bobbie Lee's father). Staff members had noticed a small bald spot on the back of his head and scattered eruptions on the side of his face. Mary tells us that the doctor says the eruptions are not ring worm nor is the bald spot. The spot has been increasing in size but Mary thinks Tommy has been cutting Robby's hair out. During the course of our stay, Robby has put on his own coat, gone to the store with a dime, and returned with a pack of candy and a plastic necklace which he wears around his neck.

For a few moments, Bobbie Lee is dumped in Mary's lap and when I tell Mary that the baby seems to be listening to her, she spends a few minutes talking to the baby, saying, "That's a good girl, can you say hello, what's the matter, can't you say hello?" For the first time, the baby seems to know where it is. She stares intently at Mary and even coos softly at the tender handling. When we leave and I say, "Thank you for talking with us," Mary responds genuinely, "Thanks for talking to me."

We have worn our coats for the entire visit, not uncomfortably, and Mary has had her coat on the entire time. Three of her children are barefoot and in light cotton dresses, playing on a bare wood floor. They dance about as a winter wind chills them at the front door.

Mary Anderson is a baffling paradox. Given free tickets to a circus, she was able to manage transportation for her children and herself and to get them there on a Saturday morning, yet she keeps her children out of school for weeks at a time (except for Robby) and even delays entering them in school for whole years. Her private life is guesswork; though she obviously spends a great deal of time

in bars shooting pool, she does not seem to drink to excess, nor to be dissipated. Her chaotic household has been identified by eleven different social agencies; she has adequate funds and absolutely no managerial skills nor interest in acquiring them. She is the only mother in the project who failed all of the courses in home management, nutrition, and nursing. She speaks well, and with proper effort can look very attractive, but her attempts are sporadic. She can be entranced with a fingernail kit and oblivious to an infant choking. She can be impervious to criticism, either overt or implied. A housekeeper, hired by a social agency, was scrubbing stove and refrigerator on the day we visited and was visibly annoyed at the living room mess, as if it were a reflection on her. Mary did not seem to notice the woman's annoyance, or if she did, chose to ignore it.

Oscar Lewis has rather thoroughly documented the difference between poverty and the "culture of poverty." Characteristics of the "culture of poverty" is a lack of self-determination and direction, or any sense of future. It is impossible to say, except by conjecture, whether Mary Anderson is more clever as a manipulator than the agencies which serve her, or whether she is truly locked in a kind of deterministic prison, her days measured out in small segments of pleasure and annoyance with little sense of how a family should relate, or how her frantic children are searching for someone to notice them, or of tomorrows whose seeds are planted today. Youth is still on her side, and a damaged beauty. If Robby climbs out of the morass, one feels that he will have to do it on his own. Mary Anderson is not without love for her children, but without the will to make that love real.

Pat, a staff member who has known Mary almost from the beginning, says it well. "I've tried for years to figure out what would turn Mary on, and I just can't do it -- no one can."

Probably no insight into family life as it affects a small child is more telling than a child's own words:

My mama cooks food when she comes home. My daddy comes home from work and lay down on the couch. Rah-rah (brother Ken) goes upstairs and clears up his room. Beth (sister) cleans up the TV room. Mark (brother) watch TV. David (brother) goes to sleep. I take out garbage.

11/15/72 by Richard (age 5)

This language story, written by Richard Miller, reveals a stable, comforting family life, a sense of security and belonging. It is the kind of story Robby Anderson could never write. And if Robby in a group, is noticeable because of his insecurity, the two Miller boys are equally so for opposite reasons.

The Miller family has five children, four boys and one girl. The mother has successfully completed the JVS Human Service training course and works as a nurse's aide and housekeeper for the elderly.

The older two children had the same father, Richard (now 5) a different father. The man who now acts as father, support, and head of the household is the father of Mark and the baby. It is uncertain as to whether the Millers are married, but both are conscientious workers, she in nurse's aide work and he as a "grinder" in an industrial plant. Although the family receives aid for Richard's support, the children seem to be equally cherished and included, and call their "father" Daddy. Richard's little story of his family life is significant in several respects. He has accounted for the presence of every member of his family. He knows where they are, what they are doing. He expects meals from his mama, that his daddy will be tired after a day of work. It is in the order of things that David, the baby, will sleep, that Mark (3) will entertain himself, and that the older three children will have small housekeeping chores.

There is consensus among the staff that the Millers are managing a successful, cohesive, family unit. They live in a very large five bedroom, neatly kept house. Despite the fact that both parents work, the interim time before their afternoon arrival is exceedingly well-managed by the children themselves. The girl, Beth, arrives home first, opens the house, and cares for the children until mother and father are home. Beth is not only competent; she is a manager and the other children obey her. More importantly, the children are fiercely protective of one another. One of the staff recalls that when Mark unwittingly ran out into the street and into the path of an oncoming car, his older brother ran out to save him and in the process broke an arm and a leg. It does not take long, when one observes Richard and Mark together at school, to see that despite their differences in age and temperament, they keep an eye on one another. They may be playing at opposite ends of the play room, but there is a sustained subliminal awareness of the presence of each other.

Richard is a loving, smiling child. From the beginning, staff members recall that he loved to be hugged and that he has tended to attach himself to one teacher. His current love is Becky. Early in the project, there was considerable turnover in staff who also happened to be working on a one-to-one basis with Richard. Each time Richard's teacher left, he chose another, usually a girl with long hair. Becky herself has long hair and a kind of frail mignonette quality; she is quiet, self-contained, and fond of Richard, whom she calls "Old Man." Somewhere during the day, at breakfast dawdling or when the line is forming to go to class or the bathroom, one is likely to hear Becky say, in soft tones, "Come on Old Man, hurry up." And Richard obviously not only delights in the name, he fits it to perfection.

Richard looks and acts like a little old man. He speaks slowly and deliberately and walks at an unhurried pace. He frequently stands outside the eye of the storm when a noisy game or racket is going on, looking serious and even bemused as if to say, "How childish." His eyes look wise; assigned to a school task, he will patiently plod through it. One suspects from his every move, that he has very definite notions of how things ought to be. It would be guesswork to try

to fathom why he decided a year ago that Becky needed a dress -- perhaps because she always wears slacks, perhaps because he had a mental image of how he wanted to have Becky look. Whatever the reason, Mrs. Miller was wise enough to see that the dress was an important issue for him rather than a momentary childish whim. And Richard came to school one day with his present for Becky, a purple dress he had picked out himself.

This "little old man" has a sense of humor to match his temperament. He can be surprisingly wry. A case in point is the day when a former teacher in the project returned for a visit. It was obvious that Richard did not remember her name but did not want to admit it. A staff member leaned down and whispered the name "Sandy" in his ear. Richard turned, and with perfect aplomb said, "Hello, Sandy." In the next breath, he turned with a knowing smile to his "informant" and gave a broad wink, as if to say, "We put it over on her, didn't we?"

Watching Richard in free play is more revealing of his quintessential nature than are the formal classes, where he is cooperative and a good group member. If he arrives a bit late for a story, in the free play room, he will not push his way into a seated group of the children to listen, but will stand to one side, quietly "eavesdropping," but taking it all in. At the simple scale, two metal pie tins suspended on a fulcrum arrangement by string, he will spend as long as ten minutes shifting handfuls of garden stones, working the balance to finer and finer gradations, until the scale balances exactly. During the process, he talks to himself, or explains to the nearest listener, "Watch, now this one is the lightest; so now we put one in here. Oops, too many; so let's move one over here." And finally, "There, no it's just right." His sense of even-handed justice is satisfied.

From the scale game, he moves to a puzzle clock. Each number on the clock must be fitted into place and is of a different geometric shape, although distinctions between shapes are often subtle. "Mix them up, mix them up lots. I like it when it's harder," he says. He thoroughly stirs the numbers with one hand and avoids looking at them while he does so, as if he doesn't want to give himself any advantage or make the game easier in any way.

In the corner of the free play room is a large wooden box, big enough so children can walk in upright, long enough so they can lie down. The box is a sturdily constructed invitation to make it whatever your imagination desires: a garage, a house, a boat. Richard joins a group of children who have dubbed it a house, but he joins in his own way. While the other children are busily driving to and from the house in their "cars" and Suzi is setting a table on the "lawn" Richard finds a fine quiet spot on the floor of the box house and stretches out, completely relaxed, one knee crossed over the other, a foot waving lazily in the air. He resists the blandishments of Suzi who keeps calling, "Come eat, come eat" -- a call the other children can't ignore for she has apparently fixed a feast -- a bowl of artificial fruit, an empty milk carton and all the play dishes. Richard isn't hungry.

When the rest of the "family" has stuffed themselves at Suzi's party, they decide that a nap is in order. Four bedmates are too much for Richard. Without a complaint, he rises from his cozy spot and finds something else to do at the art table, keeping a watchful eye on the progress of the "family game." When the population in the bed is reduced to two, apparently more to his liking, he returns to the box house, and crawls in next to Sally saying, "I'll sleep in the middle next to mama." He slings one knee over the other again, and the lazily waving foot is back in motion. It is the contented foot of a happy man whose house is in order the way he likes it.

Mark Miller, Richard's 3 1/2 year old half-brother, has a piquant round face, enormous sad eyes, and a sturdy little body. The eyes are deceiving; at first glance one wants to put his arms around Mark and say, "Come on, little guy, why so sad? Can you smile for me?" Before long, one realizes that Mark is smiling inside a great deal of the time. Mamie, a staff member who has known him from the beginning, recalls that he had one of the most imaginative fantasy lives of any child in the project. Like Robby, he was, and is an avid driver of imaginary cars and big trucks. He also had a period in his development when he loved cubby holes, cabinets, closets -- any hiding place; he would crouch patiently and unafraid, breathlessly waiting to be found, then bursting forth with obvious delight at being discovered. He loves to make faces, to dance and click his fingers rhythmically. He is, in fact, a secret joker with an independent streak a mile wide.

Mark pours out abundant energy all day long, until he doesn't want to do something. He can muster an amazing passive resistance. If he decides he doesn't want to leave the play room, his pace is glacial and his tears silent. The ferocity of his independence is more than the expectable kind of behavior one sees in most three year olds when they begin "feeling their oats." Staff members recount with amazement how Mark, at two, took on a boy twice his size (the biggest boy in the school as a matter of fact) and did so without hesitation. Richard, who is gentler, often defers to him. If they arrive at school a few minutes late, he first serves oatmeal to Mark, and Richard doesn't mind to wait for his.

Class days for Mark are still uneven. It is expected that three year olds have shorter attention spans than older children in the project, and Mark's attention depends on his mood. On one day, math may fascinate him. When he learned to make three's he created a picture of the Three Bears with three's for bodies. On another day, he may be bored with the cuisenaire rod exercise and wiggle endlessly, sliding back and forth on his chair, sliding off on the floor, toying with the rods. Becky manages him by walking off and leaving him alone. She says, quietly and without fanfare, "No class when you fool around. You'll just have to stay here by yourself." The math cubicle is strangely quiet as Becky moves to another part of the room. When the math period is over (in about five minutes) and Becky returns to check on him, her voice can be heard saying, "You accomplished more when I was gone than you did when I was here to help you." Interestingly enough, Mark has not tried to "escape" and has waited for

Becky to come and look at what he has done. He has merely been "testing" her today, giving deliberately wrong answers, trying to find out how far he can push her.

Jerri's Reading Readiness class is another story because Mark has competition. He attends the class with George and for some time a contest of wills has gone on between them and Mark has usually won. Jerri reads the boys a story about traffic lights, and has, behind her, a large colored poster with red, green and yellow lights drawn on it. The children must respond to her questions by speaking in complete sentences: "Yes, traffic lights work all day" or "The red light says Stop" or "Traffic lights work when it's nighttime too." Mark has his own inimitable way of begging the question. Jerri asks him, "What do the traffic lights do when it's nighttime?" Mark, with a grin, answers, "When it's night, we have to go to bed." Jerri persists, trying to drive home basic rules of street safety. "What if a dog would chase you, would you go in the street?" Mark is ready, again in his own way. "If a dog chases me, I get on my Big Wheel and run." Like Becky, Jerri realizes that Mark is having one of his independent days and since only a few minutes of the class remain, she tactfully gets out two pencils and suggests that the boys draw. Mark immediately flops on his stomach, draws an enormous circle, two smaller ones -- his Big Wheel (tricycle) takes on rapid shape. In a moment there are two more "Big Wheels." He explains, to the air and to any interested listeners, "This one is Ken's (his brother) and this is Beth's." George is watching all this, and trying to create something equally grandiose when Mark quickly draws four small wheels and connects them with great flamboyant black scratches of the pencil. "This is my daddy's car, and my baby (David) is going to have a Big Wheel too." George can stand the display no more. He counters, "Your baby is not by (not here)." Mark leaps into the fray, "He is." George retorts, "He isn't." The class ends with "He is," and "He isn't" growing louder and now in at least its twentieth repetition. Mark shows no signs of flagging.

By the time Mark reaches the free play room, he is ready for a quieter activity. The other children are playing group games or listening to a story, but Mark chooses to look through a huge catalog of sample Christmas cards. He begins at the beginning and carefully turns every page, examining the pictures and their details minutely. He can name every object on the cards and says out loud, "These are doves," "There's Santa and his sack," "This one's got flowers" and "This one's rough." He fingers the glitter and glue of a Christmas tree card. As he turns the page to a pair of clasped hands symbolizing Peace, he turns with a sly grin and says, "How about shaking hands?" His stubby fingers are already extended and his handshake is firm and friendly.

By this time, it has begun to dawn on George, also in the free play room, that maybe Mark is having more fun than he is. Since George has had at least a 50% success in the "Big Wheel" argument, a success that doesn't happen with Mark too often, George decides to press his new-found advantage. A small shove, and the scuffle is on. It is as

quickly resolved by Florine, who is reading to a group of children and needs a modicum of quiet. Within seconds, both boys are seated in a reasonable truce, but Mark has the last word. "Now don't screech, George, you're too noisy."

One might interpret Mark's day as unreasonably aggressive or segmented. It must be remembered that Mark is a three year old with big ideas. Moreover, he has taken note of events that seemed at the time to wash over him unnoticed. Six hours after the math class, as the Miller boys are putting on their coats to go home, Mark tells Richard, "Becky didn't want me today."

The home to which Richard and Mark are going is a haven. Richard's little story tells it one way; Mark's another:

Beth is my sister. She keep on going upstairs and sleeping with me. Her bed broke down. That's why she got a new one. She wear a funny mask when it was trick or treat.

11/15/72 by Mark (age 3)

Mark's construction of the family is less complete, more interested in the events of specific days. Beth is the sister who takes such good care of him. They have a new bed. The story is written in November and Halloween fun is still fresh in his mind.

As important as the intrinsic family stability in the lives of Mark and Richard is the conviction on the part of both mother and father that education is important. The Miller children attend school every day. On occasion, when they have gotten ill at school, their mother leaves work and comes immediately to get them. It is significant that getting the children to school has not been a simple matter of putting them on a bus, but often has involved long taxi rides. It is an expense which the Millers assume without complaint. With this kind of family loyalty and attention to school attendance, Beth is earning good grades in school. Richard and Mark stand a good chance of doing the same.

An infant photograph of Cindy Baker belies the six year old girl now in first grade. Cindy was a fat, heavy-bottomed baby whose first efforts at walking resembled those of a "Tippy-clown" weighted at the base; staff members wondered if she would ever learn to walk. Today, Cindy has thinned out, wears glasses of which she is very proud, and is happily and successfully adjusting to first grade.

Two qualities spring to mind immediately for those who have known Cindy over the years of the project: her humor and her verbal ability. Cindy's humor takes a variety of forms. She loves to pretend exchanged identities, saying "You're Cindy and I'm Florine" or "I'm Jerri and now I'm going to teach you this." On the day of physical examinations for the children, many of them were suspicious or frightened of the needle used for blood samples. Cindy thoroughly

enjoyed the whole process. She willingly complied with the disrobing procedure for the physical and was entirely cooperative. To the doctor's surprise, when he had finished, Cindy looked him straight in the eye and with a twinkle said, "Now it's your turn to get undressed, and I mean your everywhere too." She lay very still and fearless as the needle was inserted into her arm for the blood sample; when the needle was removed, she simply held up the other arm, in case he might want to repeat the procedure.

A visit to relatives in Chicago when she was about three seems to have been something of a watershed for Cindy. After a two week stay, she returned to school able to dance and to sing a variety of songs. By the time of Cindy's "graduation" from the project, she was unquestionably the "funniest girl" and received the "Most Humorous" class award.

There are several evidences of unusual verbal ability in Cindy. First and foremost, she loves to read and is a good reader. From the beginning she loved books and letters; as soon as she was able to read she began taking books home to read to her mother. This basic interest in words is coupled with excellent imitative and memory skills. Staff members recall that it was never necessary for them to send notices of school announcements or events home with Cindy. She would ask to have them read to her once, and could repeat them almost verbatim. The director of the project has the following entry for Cindy, written while she was still quite small. After one hearing of the familiar nursery rhyme, Cindy wrote: "Cow jumped over the moon. The dog laughed because it was funny. The dish ran away with the spoon. And the cat singing -- I don't know -- and that's all." Note that Cindy translates "laughed to see such sport" to "laughed because it was funny," recalls all the elements and action of a nonsense rhyme and is puzzled only by "Hey, diddle, diddle, the cat and the fiddle" which she remembers as "The cat was singing."

Cindy's ability in this regard did not go unnoticed by people outside the project. To everyone's surprise, Cindy's Sunday School teacher appeared at school one day and introduced herself by saying, "I just had to come and see what kind of school it was that produced Cindy." She explained that Cindy read and learned so much better than others in her age group that she had been placed with an older class in Sunday School. The teacher had first noticed Cindy's ability on the ride to church on Sunday mornings. The teacher customarily taped to her dashboard a verse of scripture, an adage, or a bit of the Bible lesson. She had found that Cindy could read the sayings perfectly, and had taken her own time to visit Cindy and her school. Cindy was perfectly confident that her Sunday School teacher would come to visit and had mentioned the fact to staff members who thought she had misinterpreted her teacher's intentions. The day she arrived, staff members were taken aback; Cindy simply said, "I told you she was coming."

A visit to Cindy's home is memorable for the sense of order it conveys. Cindy's mother, Jane Baker, has six children. Four of the

boys are older than Cindy, and for a time Cindy was the "baby." She now has a baby brother, Stephen, who is two. Jane Baker's husband left not long after Cindy was born, and since then Jane has managed the household alone. She works as a domestic, cleaning floors and halls in office buildings at night. She leaves the house about 4:30 and returns home about midnight. A sister who lives nearby takes care of her children in her absence.

We have chosen a day to visit when Cindy will be home with her mother. The day is bitterly cold and cars are stacked solid along the curbs in front of the Baker home. The only available parking is at the rear of the grey shingled house along an alley road that cuts through the middle of the block. We walk through a snowy, deserted backyard, past a lonely clothesline, and knock at the back door. Jane has been expecting us and lets us in quickly, saying, "It's so cold out there, come in and get warm." She leads us through a dimly lit back hallway whose walls give off the glare of the "institution tan" colored enamel paint used by millions of landlords and into a warm, clean kitchen. Cindy is sitting on the floor, laughing and playing with two year old Stephen. A small television is on, tuned low, and a children's program is in progress. Jane takes our coats and disappears for a moment to hang them up, then leads us into the dining room.

Jane Baker has limited literacy, if she reads at all, and she is hampered in her eagerness to communicate because she often has to search for words. No mother could be more proud of a child than Jane is of Cindy. She tells us that Cindy likes first grade, continues to bring books home from school and never complains. "My boys are always up in them face asking for things, but not Cindy." She tells us that when Cindy first started "school" she missed her very much, but Cindy liked it so much that "I got used to it real quick." "Cindy was so easy when she was a baby, she never was no cry baby wanting me to lap her all the time. I never did have to learn her how to hold things -- just give her a bath and she would play with toys and things." Jane smiles at the memory. "Oh my but she was slow walking and a heavy baby to hold, but real soon she was looking at the letters on the 'pop' cartons." She tells us that Cindy has just sung in a talent show for her Sunday School and is now learning a piece for the Christmas program.

Cindy and Stephen have become curious about visitors and come into the dining room. Staff members have noted that Cindy often acts more "babyish" around her mother and today is no exception. She is having a silly streak of giggling and funny faces. One is never sure whether Jane understands entirely the purpose of visits but she is obviously eager for Cindy to make a good impression and sends her to her room to get her School Yearbook. The Yearbook is obviously a family treasure and Jane handles it carefully, showing the smiling pictures of Cindy and her class, examples of her work and writing. When Stephen reaches for the book, Jane quickly retrieves it, saying, "Now don't you spoil the book." Pat, who is accompanying me, takes Stephen in her lap; he comes to her easily and unafraid of strangers.

He is a sturdy, beautiful little boy, warmly dressed in a white sweater, Oshkosh overalls which look spanking new, and freshly shined white shoes with little bells on the shoelaces. Cindy is shining clean as well, and Jane herself has on a bright red zip-up-the-front cotton dress with no sleeves. Despite the freezing weather outside, the house is cozy and comfortably heated.

One learns more about Jane Baker and her love for her children from silent observation than from conversation with her. She cannot tell you what books Cindy is reading, because she probably cannot read the titles herself, but she tells us that as she was getting Cindy ready for school each morning, after a night of work herself, she would ask, "Now Cindy what did you do in school yesterday?" and Cindy would recount her day. Staff members recall that on occasion, Jane would keep Cindy home from school for a day, "not because she's sick, but just to be with her." With the work schedule Jane keeps, her hours with Cindy were confined to the brief periods in the morning, since she arrived home from work after Cindy had gone to bed. And so she compensated by taking a day now and then, to be with her "star" -- for Jane thinks of Cindy as her star. Doubtless Cindy's academic motivation comes partly from this kind of loving nurturing at home.

What strikes one most of all about Jane Baker is an innate civility and a sense of the beautiful that has never had a chance. Jane herself is somewhat plain, in her mid-30's, slim, with work-worn hands. Her dining room has heavy dark woodwork, so popular in the twenties, and one wall contains a built-in china cupboard. The cupboard is orderly and used as it should be. There is no Haviland nor Limoges china in Jane's life, but she has carefully arranged four stemmed, cut glass peanut butter glasses as if they were Waterford crystal -- and they shine. Another shelf contains several Pepsi Cola and Coke cans, arranged symmetrically for color. At the window, a pair of slightly too long fiberglass drapes are pulled shut to hide a dreary landscape outside. The drapes are gold and match the gold, high-low, carpet. Her dining room set is formica, but the chairs are carved in pseudo-Spanish, the table legs curve gracefully, the upholstery is a shiny gold imitation of satin. A bouquet of plastic tulips is carefully arranged at the center of the table while at the end of the room, two very tall decanters of blue glass, the kind that proliferate by the thousands in discount stores, stand guard from their positions atop a radiator. Beyond the door, the living room, done in shades of gold, brown and green, is as composed and uncluttered as a model room in a department store. Jane had doubtless expected us to arrive by the front door, but she is the kind of housekeeper who can welcome guests at the back door, lead them through the kitchen, and not be ashamed anywhere along the way.

Jane Baker probably has fewer moments of real pleasure for herself than Mary Anderson -- she is older, plainer, can't play pool, works away her nights. Like Mary, she is without a man in her household and must manage for herself. And manage she does. Her family is a cohesive unit and Cindy never has any doubt that she is loved.

By the time we leave, Stephen has drifted off to sleep in Fat's lap. Jane takes him in her arms, nuzzles him, and shivers at the prospect of having to go to work in the cold in an hour or so. We leave with the feeling that human dignity thrives on stony soil somehow and with a tenacity that puts us to shame.

APPENDIX II

INFANCY PROGRAM

- A. Developmental Checklist
- B. Sample Infancy Activity Sheet

Child's Name: _____

Teacher: _____

Date: _____

Developmental Check List

Self Help

- _____ 1. Indicates when pants are wet or dirty.
- _____ 2. Verbalizes need to go to toilet in time to avoid accidents.
- _____ 3. Can pull pants down.
- _____ 4. Can pull pants down and up.
- _____ 5. Cares for self completely at toilet.
- _____ 6. Puts on shoes.
- _____ 7. Can unbutton clothing. (front) _____
- _____ 8. Can button clothing. (front)
- _____ 9. Dresses and undresses self with help.
- _____ 10. Laces shoes but can't tie.
- _____ 11. Dresses and undresses self without help.
- _____ 12. Ties shoes. _____
- _____ 13. Washes and dries face independently.
- _____ 14. Can brush teeth independently.
- _____ 15. Shows recognition of food.
- _____ 16. Takes semi-solids from spoon.
- _____ 17. Holds bottle.
- _____ 18. Uses fingers for eating.
- _____ 19. Drinks from cup or glass assisted.
- _____ 20. Chews solid or semi-solid food.
- _____ 21. Mouthes only edible objects.
- _____ 22. Drinks from glass unassisted.

- ____ 23. Asks for food and drink.
- ____ 24. Uses spoon with help.
- ____ 25. Uses spoon unassisted.
- ____ 26. Uses fork unassisted.
- ____ 27. Pours liquids from pitcher or bottle.
- ____ 28. Uses knife for cutting and spreading.

Motor (gross)

- ____ 29. Sits alone steadily.
- ____ 30. Crawls. (Uses arms to pull self along floor)
- ____ 31. Creeping on all fours.
- ____ 32. Stands holding furniture.
- ____ 33. Stands alone.
- ____ 34. Walks when led.
- ____ 35. Walks alone.
- ____ 36. Walks backwards.
- ____ 37. Can sit himself down in chair.
- ____ 38. Walks upstairs with aid.
- ____ 39. Walks downstairs with aid.
- ____ 40. Walks upstairs without aid.
- ____ 41. Walks downstairs without aid.
- ____ 42. Runs well straight forward.
- ____ 43. Runs avoiding obstacles.
- ____ 44. Balances on one foot for short periods.
- ____ 45. Walks on tiptoes.
- ____ 46. Jumps with both feet.
- ____ 47. Can catch a ball.
- ____ 48. Joins in games requiring group movement. (Ring Around Rosie or Farmer in the Dell).

___ 49. Hops on one foot.

___ 50. Skips.

Motor (fine)

___ 51. Transfers objects from hand to hand.

___ 52. Picks up object in one hand using fingers.

___ 53. Marks with pencil or crayon held in fist.

___ 54. Imitates scribble.

___ 55. Builds tower of three blocks after demonstration.

___ 56. Draws straight line on paper.

___ 57. Turns pages one at a time.

___ 58. Strings large beads.

___ 59. Handedness well developed. *

___ 60. Cuts with scissors.

___ 61. Holds crayons in fingers rather than fists.

___ 62. Copies circles.

___ 63. Cuts along a line.

___ 64. Cuts around the shape of a picture.

___ 65. Prints more than one capital letter.

___ 66. Copies a square.

___ 67. Colors circle attempting to stay in boundaries.

___ 68. Prints first name legibly.

Language (expressive)

___ 69. Babbles inarticulately.

___ 70. Laughs aloud.

___ 71. Single sounds (vowel).

___ 72. Imitates sounds made by teacher.

- _____ 73. Imitates syllables as well as sounds.
- _____ 74. Vocalizes 2 words. Specify _____.
- _____ 75. Vocalizes 3 or 4 words. Specify _____.
- _____ 76. Uses meaningful gestures. (Points, nods yes or no)
- _____ 77. Vocabulary of ten words.
- _____ 78. Asks for wants by naming objects. (cookies, milk, etc.)
- _____ 79. Combines two words.
- _____ 80. Names common objects.
- _____ 81. Refers to self by own name (Johnny go home, etc.)
- _____ 82. Uses short sentences. (Go big car, etc.)
- _____ 83. Uses pronouns me, my, mine.
- _____ 84. Asks for "another" or "more".
- _____ 85. Answers "What is your name?".
- _____ 86. Answers simple questions. (What does a dog say?)
- _____ 87. Asks questions. (What's that?)
- _____ 88. Uses question for "why?".
- _____ 89. Uses some plurals correctly adding "s" to the end of words.
- _____ 90. Refers to self as "I".
- _____ 91. Uses two or three sentences to relate an experience.
- _____ 92. Comprehends simple questions and gives sensible answers.
- _____ 93. Spontaneously identifies familiar people by name.
- _____ 94. Can define simple words. (ball, shoe)
- _____ 95. Uses prepositions and conjunctions (and, into, on, under)
- _____ 96. Speaks in complex sentences connecting "because", "but".
- _____ 97. Asks the meaning of words.

Language (receptive)

- ___ 98. Reacts to sudden noises with facial expression or movements.
- ___ 99. Reacts to objects by action or expression.
- ___ 100. Turns to speaking voice.
- ___ 101. Follows simple instructions given by the teacher when accompanied by gestures.
- ___ 102. Responds to "Show me a dog", etc.
- ___ 103. Follows simple directions given without gestures.
- ___ 104. Can identify the usage of things. * (Show me the one that's good to eat.)
- ___ 105. Sustains attention for at least 5 minutes when listening to a story, record, etc.
- ___ 106. Identifies action in pictures. (boy running, go in car)
- ___ 107. Understands directions containing "in", "on", "under", etc.
- ___ 108. Follows 2-step command. (Get a book and bring it here.)
- ___ 109. Sustains attention for 15 minutes when listening to story, etc.

Basic Knowledge

- ___ 110. Has concept of one. *
- ___ 111. Understands "one more". *
- ___ 112. Knows "how many" up to 2. *
- ___ 113. Names one color.
- ___ 114. Matches items as to color.
- ___ 115. Matches items as to form.
- ___ 116. Matches items to shape.
- ___ 117. Has concept of big and little. *
- ___ 118. Counts to 3 meaningfully. *
- ___ 119. Identifies all primary colors (red, yellow, blue, green) by name.

- ___ 120. Knows own sex.
- ___ 121. Knows body parts. (head, eyes, nose, mouth, ears, arms, hand, legs, feet.)
- ___ 122. Has concept of two or three. *
- ___ 123. Can recite names of the days of the week.
- ___ 124. Has simple concepts of weather. (warm, cold, sunny, cloudy, rain, snow)
- ___ 125. Has concept of loud and soft. *
- ___ 126. Has concept of back and front. *
- ___ 127. Names twenty or more common objects.
- ___ 128. Draws a man with head, legs, body, and features.
- ___ 129. Can count ten objects.
- ___ 130. Understands first, middle, and last. *
- ___ 131. Knows own age.
- ___ 132. Has concept of heavy and light. *
- ___ 133. Copies familiar words.
- ___ 134. Understands concepts of "more and less". *
- ___ 135. Understands "right" and "left". *

* See list of specific tasks for these items.

ITEM EXPLANATIONS OF DEVELOPMENTAL CHECK LIST

Motor (fine)

59. When you hand the child an object does he consistently take it using the same hand? Does he hold the crayon in the same hand 3 times out of 4? Which hand?

Language (receptive)

104. During lunch or any other time during the day, ask the child to identify objects by their uses (examples: show me what we drink out of, what do we sit on, show me what we write with). Check the item if he has gotten 7 out of 10 questions correct.

Basic Knowledge

110. Put several objects in front of the child. Ask him, "Show me one block (one book)".
111. Put several objects in front of the child. Ask him, "Show me one"; then, "Give me one more."
112. Put one object in front of the child. Ask him, "How many?"
Put two objects in front of the child. Ask him, "How many?"
117. Use 2 objects of different size, but the same shape and color (ex., a big and little tin can, a big and little cardboard box). Ask the child to show you the big one, then put it back and ask him to show you the little one.
118. Put 3 objects (alike) in front of the child; ask him to count them.
122. Put 2 objects in front of the child; ask him, "How many?"
Put 3 objects in front of the child; ask him, "How many?"
130. Use a 3 car train or 3 chairs in a row, etc.; ask the child to show you the first one, the middle one, the last one. Change the order each time you ask the child.
134. Put a pile of buttons (or blocks) in front of the child. Separate it into a big pile and a little pile. Ask the child which has more in it. Ask him which has less.

An Example of an activity sheet written specifically for a 12 month old follows.

MICHELLE

ACTIVITIES TO EMPHASIZE

Age: 12 mos. (Feb. 69)

I. Self-help:

- a. using utensils - during mealtimes
 - practicing handling spoon, cup, etc. while feeding a doll
 - pouring water from cup to cup, spooning salt, sugar, detergent into jar

II. Gross motor:

- a. sitting in chair alone while listening to music or teacher's lesson or while teacher sits next to her to read a story or feed her
- b. walking through obstacle course made by placing large blocks so that the child must step around, over, or on and off the blocks or must make turns around them to get to the teacher who may first walk through the pathway with the child; the child may also be encircled by blocks or chairs which she will have to push away, crawl under, step over to get out or being on the outside to get in to the teacher or some object she would like to reach to eat or play with
- c. going in and out of big boxes, through a hula hoop raised off the ground, or through the tunnel under the slide
- d. climbing the slide and the step stool
- e. walking on balance beams, between lines, around shapes placed on floor
- f. playing games involving group movements such as:
 - "Ring-around-the-Rosy"
 - "London Bridge"
 - "Hokey-Pokey"
 - "Bend and Stretch"
 which combine motor coordination with rhythms

III. Fine motor:

- a. pulling objects on and off magnetic board ("Put up the boy. Take the tree.")
- b. playing with balls -- throwing, rolling, bouncing, tossing up

IV. Expressive language:

- a. imitating sounds made by the teacher or sounds like animals, trains, etc.
- b. imitating gestures (waving "bye-bye")
- c. producing rhythms by clapping or drumming
- d. increasing basic vocabulary words by labeling and naming objects, people, actions commonly seen or used

V. Receptive language:

- a. increasing ability to follow simple instructions.
(Find the dog, "Pick up your spoon")

VI. Basic knowledge:

- a. continuing to learn body parts (action songs such as "Put your finger on your head, on your head (nose, foot, etc.)")

APPENDIX III
LANGUAGE PROGRAM

PRESCHOOL-LANGUAGE PROGRAM

There were two main aspects of the language program: one was built upon the activities and experiences developed through the use of the Peabody Language Development Kit (Levels #P and L) and the other based upon informal, small group discussion sessions which emphasized the cognitive use of language.

The Peabody Language Development Kit Level #P is designed for use as a comprehensive oral language program for children who are functioning at a mental age of 3-5. It was incorporated as an integral part of the educational program, with minor adaptations, when the children were 2 1/2 years old. The comprehension manual, with its sequenced lessons, was ideal for para-professional teachers. Moreover, the bright, colorful materials and the variety of activities in the kit easily held the interest of the children.

The Peabody program stresses overall oral language development by concentrating on the cognitive processes involving convergent, divergent and association thinking as expressed through the vocal and motor channels. The manual includes 180 daily lessons made up of some 701 activities. These activities deal with such things as naming, describing, matching, remembering, sequencing, sentence building, rhyming, listening, story telling, problem solving. Level #P of the Peabody Kit emphasizes teaching patterns of syntax and simple grammar.

Since Standard English was not spoken in the children's homes and neighborhoods, and it was felt that basic cultural patterns should not be disturbed, our program did not emphasize this aspect of the Peabody program, nor did it attempt to teach Standard English.

While comprehension of Standard English was emphasized, expression in Standard English was not. Anyone desiring more information may consult the teacher's manual of the Peabody Language Development Kit Level #P.

A second aspect of the language program was expanded to provide a wider range of experience with the cognitive uses of language. Emphasis was placed on 1) comprehension, 2) vocabulary acquisition, 3) communication, and 4) critical thinking.

Comprehension. A child's ability to interpret oral language is vital to future academic success and to overall intellectual development. First of all, he must have the ability to listen or attend to the spoken word. He must learn to follow and organize sequences of words into a whole. On the basis of this input he must be able to act and react; and remember the gist of what was said. The purpose of the comprehension activities is to give the child practice in being able to listen, follow, interpret and remember verbal sequences.

To this end a variety of activities were presented. Poems, songs and stories were read to the children. The children either chose pic-

tures appropriate to the stories, put pictures in sequence, drew pictures relating to the story, related what they remembered of the story or acted out what the teacher read. Games were played where the teacher would ask the children to pass objects to one another (pass the red ball with the brown stripe and blue star), or where objects were hidden and the children were given verbal cues to aid them in finding the objects.

Vocabulary Acquisition. The expansion and refinement of the child's expressive vocabulary increases both his ability to comprehend what is said, and his ability to communicate with others. Vocabulary acquisition involves both the learning of new words and the refining of meaning of words already in use.

Meaningful expressive language begins when an infant labels an object (bottle), a person (mama) or an action (up). Vocabulary growth occurs quickly, as the child expands his word bank from concrete labels to abstract concepts. He learns to use different word forms such as nouns, action verbs, descriptive words, prepositions and pronouns.

Vocabulary acquisition was stimulated by the presentation of a variety of stories and pictures that the children could discuss. Emphasis was placed on the concepts of amount, position, size, opposite conditions, color, and shape, since the ability to use these concepts was basic to the preschool math/problem solving curriculum. Also emphasized were units on basic knowledge; transportation, food, clothing, weather, time, animals, family relations, etc. The language teacher prepared activities to emphasize each unit; flannel board cut out, large picture cards, stories, objects, dramatic play and, when appropriate, a trip (zoo, firehouse, grocery).

Communication. The third area, of communication, deals with the child's ability to express himself: to express his feelings, and emotions, share experiences, communicate ideas and use language meaningfully. To foster the child's communicative ability, language classes included short discussion periods where any topic brought up could be discussed (T.V., movies, zoo, home problems). Other activities included creating group stories or individual stories about magazine pictures.

Critical Thinking. The child's ability to use language for problem solving, reasoning, and critical thinking was the goal of the entire educational program. Not only must the child be able to comprehend what is said, build a meaningful vocabulary, and express himself, but he must also be able to apply this knowledge. Responding to open ended questions, drawing inferences, predicting outcomes, making comparisons and drawing conclusions are but a few of the aspects of critical thinking. Although it would be impossible to list all the activities which could contribute to strengthening the child's ability for critical thought, a partial list of activity ideas follows and more are located in the math/problem solving appendix.

a) Open ended questions:

What does a dog say? a lawnmower do? a box hold?
 What do you think will happen next? happened first?
 What belongs to the mailman? teacher? in a grocery?
 What do we use a telephone for? a bag? a box?
 What would you do if you lived in a tree? if you had only one block?
 How could you reach the other side of the lake? a box on top of a shelf?
 What can we ride on? eat with? go with? roll down?
 Describe a dog; a bicycle; an envelope.
 Where would you be if you saw an elephant? a fire truck?
 Could a house fit in a bathtub?

b) Sentence completion:

I sleep in a _____. I live in a _____.
 Steve left the house and went to _____.
 A little girl can _____.

c) Pretending games:

"Let's pretend that you are going to the zoo today. What will you bring with you? What will you see? What sounds will you hear? What colors will you see?"

d) Guessing games:

I'm thinking of something that is red, has wheels and hoses.
 What is it?
 I'm thinking of something that you can eat...that is a dessert...
 that is cold...that is brown.

e) Describing games:

Show the child an abstract design or an object without a label (ex., piece of machinery) and ask him to describe it.
 Have one child act out an animal or a movement and ask the other children to describe what they see.

f) Predicting outcomes:

Let the children guess and discuss the outcome of stories.
 Show the children pictures and ask them to guess what could happen next.

APPENDIX IV. A

READING PROGRAM

Preschool - Reading Program

For purposes of discussion, the reading readiness program will be separated from the formal reading program while in practice the transition from one to the other occurs gradually and naturally. In fact, it would be difficult to find the point of demarcation between the readiness aspects and the act of reading. The major emphasis of the reading readiness program is to develop those skills which facilitate word recognition. An outline of the development of these skills appears in Figure 2.7

The development of skill in oral language, with special emphasis on vocabulary development and comprehension, is another component of the reading program, but is given less emphasis because such skills are heavily focused upon within the language program.

Dimensions of the Reading Readiness Program

The reading readiness program is divided into four main areas: visual skills, auditory skills, symbolic representation, and motivational factors. Each area will be briefly explained. Sample activities designed to facilitate the development of these skills are listed in the appendices.

Visual Skills

The visual skills associated with beginning formal reading have their origins in sensory awareness of visual patterns in infancy. Over time, with adequate opportunity to react to visual stimuli, children come to discriminate visual patterns of words and word elements. Development of skills related to both visual discrimination and visual-motor abilities are considered. Visual discrimination, the ability to perceive similarities and differences in visual stimuli of increasing complexity, is aided by developing skill in visual memory, without which visual information could not be stored and recalled, and in visual-spatial awareness.

Visual-spatial awareness is facilitated through activities geared to focus on direct-onal and position concepts: the left to right, top to bottom visual approach required for reading and the above, below, left, right, beside concepts which may aid in distinguishing between visually similar letters such as b, p, d, q, t; F, E; and B, P, D, R. Visual closures, the mechanism which allows us to complete visual images mentally is, most likely, a contributing factor in rapid, adult reading, when visual perception of letters and/or visual patterns seems to be a catalyst for word phrase or sentence recognition. Activities designed to provide experience using visual closure skills are included as a part of the readiness and formal reading program.

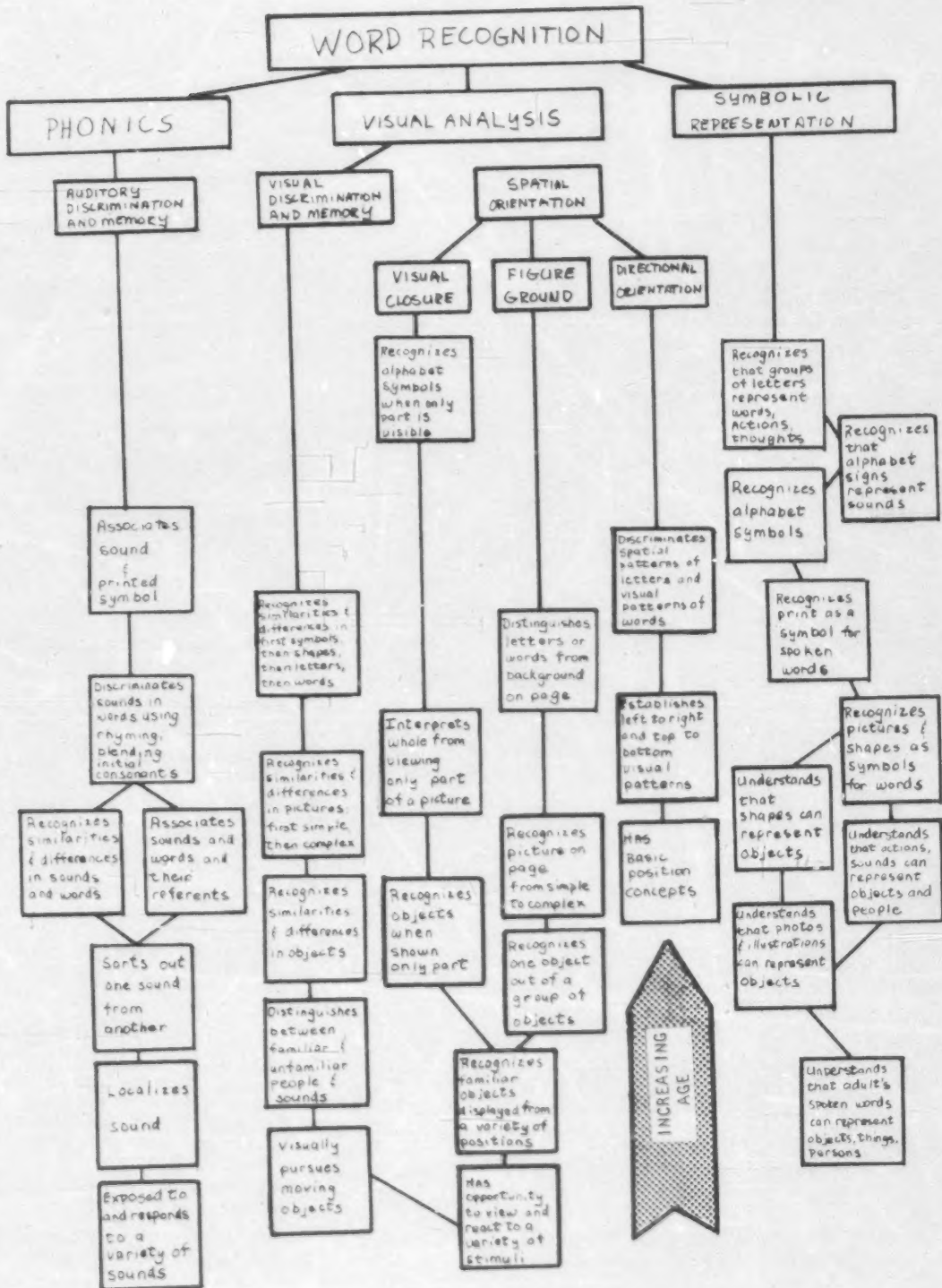


Figure 2-7

As one would expect, visual-motor activities, especially those directly relating to developing the eye-hand control necessary for writing are also a part of this program.

Auditory Skill

Research has suggested that skill in auditory and visual discrimination is the best predictor of initial reading success, with auditory discrimination ranking first (Durrell; Murphy and Jerkins, 1941; Harrington and Durrell, 1955). Throughout the preschool years, the auditory mechanism must be refined from the simple level of reaction to sound at birth, to the complex level of differentiating the sequence of sounds in words and associating these sounds with symbolic referents in order for the child to experience success in learning to read. The readiness program provided early exposure to activities and experiences designed to facilitate the growth of both auditory discrimination and auditory memory. Children as young as two participate in activities which focus upon subtle differences in initial and final consonant sounds and medial vowel sounds.

Auditory comprehension activities such as sentence completion, sequencing events, nonsense sentences, story telling, building and illustrating are a part of the reading as well as the language program.

Symbolic Representation

This aspect of the program focuses on developing the concept of symbols; i.e., one thing representing another. The emergence of this concept is evident when children point out a shoe in a picture upon request, get a ball from the shelf upon seeing one in a book, or put an inverted funnel or pan on their heads for a hat. Development of this skill is guided from the relatively concrete to the abstract by presenting a variety of activities which use photographs, slides, realistic illustrations, line drawings, shapes and letters to represent people, objects, actions, sounds, and words. Teacher-made story boards as well as child dictated stories are used extensively to develop the concept that "print is just talk written down."

Alphabet symbols are emphasized once a child has demonstrated facility in dealing with symbols and skill in visually discriminating letters. Series of activities designed to acquaint the child with letter names, and with the association between letters, sounds and words were presented.

Motivational Considerations

It is likely that a positive attitude toward books and the desire to learn to read are influential factors for success in the initial reading process. Certain steps were taken within the educational setting in an attempt to promote the development of such concepts.

Books were used daily with infants and preschoolers. For infants, a quiet time, when the child wanted to be held, was chosen. Teachers were frequently found cuddling infants in rocking chairs and talking about colorful pictures in books.

Of high value to the young children were simple three to five page photographic story books developed by the curriculum coordinators. These books used the children and familiar adults as characters; simple stories were based upon such things as favorite toys or routine activities (see Figures on following page.)

Within the preschool setting, books were always accessible. Reading a book alone or with a friend was considered an acceptable alternative to any ongoing activity. Stories dictated and illustrated by children were periodically bound together in book form and added to the classroom library. Books in specific topics of special interest to children were provided by the Milwaukee Public Library as part of their service to preschools and day care centers.

Children were encouraged to borrow books from the center for home use. Books using the children's photographs and copies of children's dictated stories were sent home as well. Some parents reported that older brothers and sisters were reading these simple books with the preschool children.

Implementation

The teacher, with the assistance of the curriculum coordinator, plans her program to include a balance between activities specifically designed to foster word recognition skill; and oral language, comprehension, and motor skills. Through observation of the children, discussion with the teacher, and results of the evaluation check lists, decisions are made regarding children's progress, appropriate content, materials, and program effectiveness. The results of such interactions are compiled into lesson guides from which a teacher develops specific lesson plans for small group learning experiences. These guides may take the form of an explanation of goals, progressions of specific concepts, an outline of areas needing extension with suggested activities, an overview of goals or areas with related equipment.

LESSON GUIDE

PRESCHOOL

Summer 1969: 24-30 months
Children: Ricky, Michelle, Kevin
Teacher: Betty S.



Cover



page 1



page 2

Figure
EATING STORY



page 3

READING READINESS

1. BODY AWARENESS (position in Space)

- a. Emphasize the basic body parts. Help the child to identify these on himself, in a mirror, on you and in pictures.
- b. Introduce clothes associated with different parts of the body - shoes, socks, shirt, pants, etc. See if the child can show you where they belong on himself. Point out clothing in pictures. See if the child can point it out to you.
- c. Use songs which emphasize part of the body:
 "Put your finger in the air"
 "Head, shoulders, knees and toes"
 "Where is thumbkin?"
- d. Shadow play. This can be done outside by pointing out the child's shadow or indoors by using a film strip projector and turning the light on. Let the children "dance," jump, stand and sit, wave their arms or do any motions they choose to do to make his shadow move. This activity can be accompanied by music.

2. VISUAL PERCEPTION AND DISCRIMINATION

a. Matching activities

- 1) Object to object. Place two objects on the table for the child. The teacher should have a duplicate set. Show the child an object and ask him to find the "truck that is just like my truck." If the child prefers to just manipulate the objects on the table, reverse the procedure and tell him that you have one just like his, and talk about it with him. If he wants your object, give it to him while you tell him something about it - its color, size, purpose, etc.

Once a child will find an object like yours from a group of two, increase the number of objects in the group and the similarities among them.

- 2) Picture to picture. Once the child has demonstrated that he can match objects, have him match very simple pictures. Progress from simple to somewhat more complex.
- 3) Pictures to objects. After the child has shown some success with both one and two above, introduce matching pictures and objects.
- 4) Matching symbols. After one and two have been mastered by the child and he has had some experience with number three, have the children match circles, squares, triangles.

b. Copying movements

- 1) The teacher makes a number of movements - waving hands or turning around or slapping the floor or clapping hands, etc. - and the child is encouraged to copy what the teacher does. This can be made more interesting by making sounds with movements.

- 2) Song: "Do as I do (sung to the tune of "Clementine" or "Oh my Darlin")"

Do as I do, Do as I do
 Do as I do, Do as I
 Do as I do, Do as I do
 Do as I do, Do as I.

The teacher makes movements for the children to follow as she sings this song.

c. Visual perception

- 1) Set up a table that is exactly on the child's eye level.



On the table place familiar objects. Ask the child to get the object you ask for. Then move the position of the object, for example, place a truck so just the front or back end is facing him, move a bottle so just the end faces him. Repeat above procedure. See if the child recognizes the objects placed in different positions.

- 2) Tape two parallel lines on the floor with enough space between them for the child to walk or crawl. For the older child tape a path on the floor and have him follow it. Music can accompany this activity.
- 3) Puzzles - complexity geared to child's level.
- 4) Provide various size containers for children to use for pouring activities in pool and/or water table.
- 5) Give the child a container and small blocks, uncooked macaroni, large buttons, or spools and have him fill the container. To make it more difficult give him containers with smaller openings.

3. LISTENING SKILLS

- a. Use nursery rhymes, poems, finger plays, records and stories to stimulate the child's interest in listening.

Musical instruments can also be used effectively. When using books keep the stories short, read the pictures rather than the words and go out of your way to be expressive. It is most important that the child like books. If books are used excessively and are read for long periods and with little expression, the children may learn to dislike them.

The reading teacher is available in the free flowing environment to read stories with the children and to write down their dictation. She makes decisions about equipment available in the reading area on the basis of the needs of specific children, or the desire to re-emphasize or expand a concept. Equipment such as rhyming games, shape stencils, magnetic alphabet letters, story sequence puzzles, or printed labels on boxes of equipment might be placed in the reading area of the free flowing environment.

Since the reading area is so closely interwoven with the language and problem solving areas, there is overlap among the goals and activities. To insure that each aspect of the reading program is being covered with each child, it is necessary to coordinate the division of these responsibilities. Checklists, such as the following (see figure 3-9), served the dual purpose of ensuring that each area was covered by at least one teacher, and of reviewing activities, areas and approaches.

Dimensions of the Formal Reading Program

There exists both in theory and in practice a heated controversy regarding the age at which a child is best equipped to begin the formal reading process. The supposition generally accepted by basal reader authors and public school systems is that a mental age of six and a half is necessary for success. However, it has been demonstrated that children three to five can learn to read successfully (Lynn, 1963; Thackray, 1964). It would appear that teaching method, size of group, previous experience and motivation are factors influencing the success of the initial reading experience.

As has been stated earlier, formal reading experiences are a natural outgrowth of the readiness program. Once a child has demonstrated competency in the following skills, an emphasis on actual reading is implemented.

1. Visually discriminates between letters and groups of letters.
2. Identifies and discriminates sounds in words.
3. Identifies and names at least half of the letters in the alphabet.
4. Associates a few select sounds with corresponding letters.
5. Uses sound-letter associations coupled with context clues (guess meaning of few printed words).
6. Recognizes own name and distinguishes it from others.
7. Demonstrates interest in learning to read.

Teacher: _____

COORDINATING
READING - AND RELATED
ACTIVITIES

Using the following code, please indicate which activities you do with each child or in each group of children.

- ✓ - I do this activity.
 0 - I do not do this activity.
 N - This is not appropriate for these children.
 ? - I don't know if I should do this activity.
 X - I probably should do this, but I haven't yet.

	Cathy	Tony C.	Michelle B.	Tony P.	Carlos	Ricky	Michelle J.	Cathleen	Michelle, Marilyn, Walter	Charles, John J., Lisa	John M., Theresa, Selena, Prina
read stories (LS)*											
records, songs, poems (LS)											
children interpret pictures (CS)											
children retell stories (CS)											
copying designs and patterns from memory (VM)											
recalls pictures just seen (VM)											
concentration memory game (VM)											
what is missing cards and/or game (VM)											
sequence cards (S)											
ordering objects by size, number, color, weight (S)											
Lotto games (VP)											

*see page 3 for code explanation

CHECKLIST FOR COORDINATING READING AND RELATED ACTIVITIES

[illegible]

	Cathy	Tony C.	Michelle B.	Tony P.	Carlos	Ricky	Michelle J.	Cathleen	Michelle, Marilyn, Walter	Charles, John J., Lisa	John M., Theresa, Selena, Prina
children dictate stories (LE)											
records group stories (LE)											
records individual stories (LE)											
teacher and children read dictated stories (LE)											
copies made for each child (LE)											
isolating words in stories for matching (LE)											
teach sight vocabulary (LE)											
review games for sight vocabulary (LE)											
poems and songs (WA)											
completion of poems (WA)											
initial consonant games (WA)											
associating letter and sound (WA)											

LS - listening skills
 CS - comprehension skills
 S - sequencing
 VM - visual memory
 VP - visual perception
 EHC - eye hand coordination
 LE - language experience approach
 AR - alphabet recognition
 WA - word awareness (phonics)

Therefore, the decision as to when to begin a formal reading program is based on the demonstrated abilities and interests of each child, not on any arbitrary variable. Using this criterion, the majority of the children began the formal reading program at age five although one child began at three and a number at age four.

For most of the children, the formal reading program consisted of expanding the use of dictated story charts to encompass a modified version of the "language-experience approach to reading" as described by Stauffer (1970). An outline of that approach appears in the appendices. However, a stronger emphasis was placed on phonics activities both in conjunction with and separate from the story charts. The following are examples of group and individual stories written by the children.

A Duck (by a 4 year old group)

A duck is running in the water.
The duck is diving in the water.

The Mouse (by a 4 year old group)

A mouse is in the house.
The mouse is under the icebox.
The mouse is in the barn.

A Car (by a 5 year old group)

You can ride in a car.
You park the car.
You put the car in the garage.
You can ride and get some hamburgers.
A car has a back seat.

My Baby Brother (by a 5 year old)

My baby brother can move in his walker.
He can move backwards and he can move sideways.
He laughs at me and he plays with me all the time
on my mommy's bed.
He also plays with his toy keys.

The Family (by a 5 year old)

My father goes to work when I go to school.
My mother holds the baby and my baby sister goes
to sleep.
When she wakes up my mother feed her some baby food.
Sometimes she eats our food.
She's big enough to walk.

After a short period of time, the Bank Street Basal Reading Series was adopted. A basal series was chosen because of the usefulness of a comprehensive teachers' guide to para-professional teachers; and the extensive use of such basal series in the Milwaukee Public Schools. This specific basal series was chosen because of its initial use of language experience charts, its colorful illustrations, urban setting and multi-racial characters.

APPENDIX IV. B
READING ACTIVITIES

Preschool - Reading Activities

- A. Reading Readiness Program
 - 1. Visual Skills
 - a. Visual discrimination and memory
 - b. Visual memory
 - c. Visual motor
 - d. Visual spatial relations
 - 2. Auditory skills
 - a. Auditory discrimination and memory of sounds
 - b. Auditory discrimination and memory of sounds in words
 - c. Auditory Comprehension
 - 3. Symbolic Representation - Alphabet Recognition
 - a. Overview of alphabet recognition program
 - b. Visual discrimination of letters
 - c. Formal letter learning
 - d. Alphabet recognition - progress analysis (evaluation)
- B. Formal Reading Program
 - 1. Language Experience Approach
 - a. Overview of language experience approach
 - b. Experience Reading Chart
 - c. Building a word bank
 - 2. Phonics Program
 - a. Overview of general progression
 - b. Rhyming Games
 - c. Rhyming - formal activities
 - d. Initial consonant sounds, blends and digraphs
 - e. Letter Substitution or Word Families

READING READINESS PROGRAM

VISUAL SKILLS

Visual Discrimination and Memory

Visual discrimination of objects: Place two objects on the table for the child. The teacher should have a duplicate set. Show the child an object and ask him to find the "truck that is just like my truck". If the child prefers to just manipulate the objects on the table, reverse the procedure and tell him that you have one just like his, and talk about it with him. If he wants your object, give it to him while you tell him something about it - its color, size, purpose, etc.

Once a child will find an object like yours from a group of two, increase the number of objects in the group.

- Variations:
- (1) Vary number of objects from which to choose.
 - (2) Choose objects of increasing visual similarity:
 - (a) Red truck from yellow trucks
 - (b) Big red truck from smaller red trucks
 - (c) Red truck with "APEX T.V. REPAIR" printed on side from red truck with "AVON CALLING" printed on side.

Visual discrimination of pictures: Once the child has demonstrated that he can match objects, have him match very simple pictures.

- Variations:
- (1) Gradually increase complexity of pictures and numbers of pictures from which to choose.
 - (2) Lotto games - bingo games.
 - (3) Finding the same page in a story book identical to the teachers.
 - (4) Sorting activities.
 - (5) Finding one item in a complex picture.
 - (6) Finding the picture that is the same or different based on:
 - Size
 - Shape
 - Color
 - Direction

Matching pictures to objects: After the child has shown some success with both one and two above, introduce matching pictures and objects.

Matching shapes and cubes: Circles, squares, triangles, rectangles, ovals, in variety of colors can be used in matching activities.

READING READINESS PROGRAM

VISUAL SKILLS

- Variations:
- (1) Sorting and lotto activities
 - (2) Decks of playing cards can be used as symbol cards
 - (3) Puzzles

Replicating patterns as a means of heightening visual perception:

a. Copying Designs

- Variations:
- (1) Child can copy a grouping of 1" cubes placed before him. Towers using certain colors or structures can be used. You should slowly progress from simple to more complex designs. If you are working on a certain structure such as a tower, keep the color the same at first.
 - (2) Copying pictures of simple block designs using 1" cubes.
 - (3) Following a design prepared by the teacher on the peg boards.
 - (4) Copying patterns while stringing beads from the actual object, from a picture.
 - (5) Copying furniture arrangements in doll house.
 - (6) Copying designs in crayon and pencil.
 - (7) Copying designs by cutting and pasting.
 - (8) Replicating sequences of letters printed on cards. Wooden tiles, magnetic board, flannel board, written.

Visual discrimination of alphabet symbols, both upper and lower case:

- a. Matching letter blocks, wooden letters, flannel letters, letter cards, letters on a page.
- b. Finding words that begin with a certain letter.
- c. Finding words that contain a certain letter.
- d. Finding words that begin with the same letter as another word.
- e. Finding words that have the same first and last letter.
- f. Finding words that are exactly the same.

READING READINESS PROGRAM

VISUAL SKILLS

Visual Memory

- To remember visual images:
- (1) Placing items on a table. Have the children name them and see how many items they can remember. Vary number of items to remember and the similarity between them.
 - (2) Using the same set up as above, remove an item when the children's eyes are covered and ask what is missing.
 - (3) Game of concentration. Regulate the number of pairs you use depending on the age, interest and skill of the children.
 - (4) Use lotto games. Once a child has completed his board, cover up one, or more items and ask him which ones are covered.
 - (5) Remove one or two pieces from a familiar puzzle and ask the child what pieces are missing.
 - (6) Copy simple designs from memory.

Visual-Motor

Provide experiences with:

- (1) Pegboards of various sizes
- (2) Beads of various sizes
- (3) Blocks of various sizes
- (4) Modeling clay
- (5) Puzzles
- (6) Scissors
- (7) Paste and tape
- (8) Clothespins
- (9) Pouring and spooning water, buttons, macaroni
- (10) Stacking toys
- (11) Crayons, pencils, paint and brushes, finger-paint
- (12) Templates
- (13) Tracing shapes
- (14) Tracing letters
- (15) Following dots to complete pictures
- (16) Making pictures out of "stick on" dots
- (17) Making pictures out of plastic tiles
- (18) Folding paper

READING READINESS PROGRAM

VISUAL SKILLS

Visual Spatial Relations

- Body Awareness: (1) Emphasize the basic body parts. Help the child to identify these on himself, in a mirror, on you and in pictures.
- (2) Introduce clothes associated with different parts of the body - shoes, socks, shirt, pants, etc. See if the child can show you where they belong on himself. Point out clothing in pictures. See if the child can point it out to you.
- (3) Use songs which emphasize parts of the body:
 "Put your finger in the air"
 "Head, shoulders, knees and toes."
 "Where is thumbkin?"
- (4) Shadow play. This can be done outside by pointing out the child's shadow or indoors by using a film strip projector and turning the light on. Let the children "dance", jump, stand and sit, wave their arms or do any motions they choose to do to make his shadow move. This activity can be accompanied by music.
- (5) Copying Body Movements.
- (1) The teacher makes a number of movements - waving hands or turning around or slapping the floor or clapping hands, etc. - and the child is encouraged to copy what the teacher does. This can be made more interesting by making sounds with the movements.
- (2) Song: "Do as I do" (sung to the tune of "Clemetine" or "Oh my darlin")
- Do as I do, Do as I do
 Do as I do, do as I
 Do as I do, Do as I do
 Do as I do, Do as I.
- The teacher makes movements for the children to follow as she sings this song.
- (6) Tape two parallel lines on the floor with enough space between them for the child to walk or crawl. For the older child tape a path on the floor and have him follow it. Music can accompany this activity.
- (7) Place bright, colored tape on the floor. Have the child try to walk without stepping on the line, only following lines, only on red lines, only between blue lines.

READING READINESS PROGRAM

VISUAL SKILLS

Directional orientation (left-right; top-bottom):

1. Set up a series of pictures in rows, and present them to the children from left to right; top to bottom.
2. Place objects or cut-out pictures on the table, wall, or pegboard dividers. Have the children touch or find the pictures as you call them out. Go from left to right.
3. Have the children fill containers with straws, macaroni, blocks, etc., from left to right.
4. In a darkened room have the children follow the light of a flashlight shined on the wall. Flash it on a spot and have the children touch the spot. Turn it off and repeat the procedure moving the spot from left to right. (It is not necessary for the room to be very dark for this might frighten the children.) Have the children visually follow a left to right, top to bottom visual pattern. Turn off the light at intervals and have the children find the last place they saw the light. Turn the light on again to check.
5. Using the wall, floor or room divider, place a picture of a boy at one end and a bicycle at the other (2 or 3 ft. apart). Connect the two with a wide, colorful ribbon-texture, which is desirable. Tell the child that the little boy wants to find his bicycle. Put your finger on the boy and follow the path to the bicycle. (Demonstrate if necessary). Procedure is done from left to right. Use straight lines, wavy lines, etc. Vary the pictures at both ends.
6. Using a single piece puzzles, point to the space in the upper left hand corner and ask the children to find that piece. Continue from left to right, line by line.
7. Pegboards may be used in the same way by having the children begin from left to right, row by row. Also give the children time to experiment by themselves.

Develop the concept of left and right:

8. Place a large, red, "stick-on" circle on the right hand of each child. Explain to the children that the hand with the circle on it is their right hand. Ask the children to find a piece of equipment (toy, furniture) in the room and touch it with their right hand. Let each explain what they touched with their right hand.

READING READINESS PROGRAM

VISUAL SKILLS

Variations: (1) Extend to all parts on right side of body.

(2) Focus on objects to a child's right.

(3) Focus on left.

9. Divide table tops in half with a strip of colored tape. Have the children place objects from a box on either the right or left side of the table.

Variations: (1) Make activity more complex by focusing on top and bottom of table top as well as on left and right.

10. Provide each child with a square of paper which has been divided vertically down the center by a thick line or tape. Also give each child a cardboard circle cut to a diameter of $1/2$ of the square. Direct the children to place the circle in the top right corner, the bottom right corner, etc.

Spatial sequences:

1. Sequenced pictures are placed in order and the children tell the story in each card as the teacher points to them from left to right. Simple 3 sequence stories should be used at first.

2. Replicating sequenced patterns:

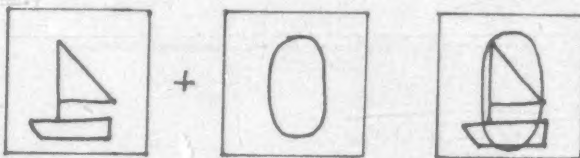
- (a) Blocks
- (b) Beads
- (c) Shapes and spaces
- (d) Letters, words and short sentences.

Figure ground:

1. Ask child to point out one aspect of a simple picture - shoe, hand, eye.

Variations: (1) Choose increasingly complex pictures and choose very specific parts for identification.

2. Make line drawings on clear plastic sheets. Place two simple drawings one on top of the other. Ask the child to locate parts of the picture.



READING READINESS PROGRAM

VISUAL SKILLS

Variations: (1) Vary number and complexity of drawings.

(2) Add color by using transparency pens.

3. Provide line designs that include hidden pictures. Have the children locate and outline the pictures hidden in the design.

Visual closure:

1. Large, clear pictures can be cut from a magazine and mounted on heavy paper. One part of the picture is removed. (Cut out the leg of the dog, the door of a house, the tire off a car.) The child is to try to tell what is missing.

2. Photographs of parts of objects - front of a car, a pencil point, part of an ear are used for identification and association with a picture of the whole object.

3. One or two parts are removed from puzzles. The extra pieces are placed in the center of the table. The children discuss what parts could be included in those missing pieces before attempting to complete the picture.

4. Outline large shapes on the floor with tape. Have the children jump or step in and out of them. If they do not recognize the boundaries of lines, use large box tops for them to jump or step into at first.

5. Make dotted line drawings of simple objects. Ask children what they see.



Variations: (1) Vary the complexity of the picture while decreasing the amount of visual cue.

(2) Have children complete the outline, add to and color the picture.

(3) Represent alphabet letters in incomplete "dot or dash" form.

6. Picture masks are made so that only small parts of a total picture are viewed at one time. Children guess what the picture is from viewing small sections.

READING READINESS PROGRAM

AUDITORY SKILLS

Auditory Discrimination and Memory of Sounds

Provide a variety of noisemaking toys in the environment.

Call attention to the noisemaking quality of each using the child's natural curiosity for direction.

Material: bells of different sounds; musical instruments; rattles; pull toys; squeaky toys; music boxes; boxes, metal cans, heavy glass and plastic containers filled with sand, Cheerios, rice, seeds, marbles, water, pennies, corn; plastic, metal, and wooden spoons for banging on wooden, plastic, metal, cloth surfaces.

Localization of sound: Use two boxes. In one box put a bell. Shake both boxes simultaneously holding one on each side of your body. Ask the child to find the box with the bell inside.

Variations:

- change contents of boxes: balls, jacks, marbles
- put a noisemaking toy in each box
- increase number of boxes

Associating sound with referent: Place two familiar noisemaking objects (drum and triangle) on a table. Have a duplicate set inside a box with the open side facing you. Play one instrument in the box (outside of the child's sight) and have him choose and play the matching instrument from his set.

Variations:

- gradually increase number of choices
- play two or more instruments sequentially
- play two instruments simultaneously
- add variables of "loud" and "soft"
- add rhythms to copy
- reverse teacher-child roles

Choose a number of noisemaking objects for which the children have verbal labels. Play on object out of sight and have them guess what it was.

Variations:

- Use taped familiar sounds with associated pictures or photographs: telephone, car, water running, footsteps, baby crying, voices of familiar people
- choose items with different potential noisemaking properties: glass, metal or plastic cup hit with a metal spoon. Show children

READING READINESS PROGRAM

AUDITORY SKILLS

the objects, explain the action, out of sight make the noise, then have them choose the referent

Matching sounds: Make duplicate sets of sound cylinders from film or orange juice cans. Fill with such things as nails, rice, corn, oatmeal, water, marbles.

Variations: -Begin simply and gradually increase number of pairs of cylinders and similarity of sound
-Match cylinders to contents

Hum a familiar tune and have the children guess or sing the song.

Variations: -hum middle or last line
-hum an unfamiliar tune and have children repeat it
-children hum tunes for others to guess or replicate

Auditory Discrimination and Memory of Sounds in Words

Initial consonant sound: Organize a set of picture cards by initial consonant sounds. Present pictures beginning with the same initial sound during one lesson. Place 3 or more cards of familiar things beginning with the "b" sound on the floor or table. Ask each child to find you a specific picture and put it into a can, box, or on a flannel board, peg board, or magnetic board. [Note: While this type of activity is directly focusing on receptive language and vocabulary development, it may incidentally make children more aware of initial sounds.]

Variations: these cards can be used for matching, sorting, lotto games, concentration games

To insure that children hear the differences between initial consonant sounds, medial vowel sounds, and final consonant sounds: Group objects or pictures according to one of the above variables and ask the children to find the object or picture. Be sure to discuss the pictures first to be sure the children are using the same label. Synonyms for ~~various~~ objects and pictures can be discussed.

READING READINESS PROGRAM

AUDITORY SKILLS

Examples: -Focusing on initial consonant sounds:

lock - clock - block - sock - rock
 pan - fan - man
 hand - sand - band - stand
 cat - hat - fat - mat - bat
 mit - pit
 bill - hill - drill - fill
 ball - fall - tall - small - wall
 bake - cake - lake - snake - steak

-Focusing on medial vowel sounds:

pin - pan - pen
 tall - tail
 hat - hit - hot
 mat - mit - mut
 bell - ball - bull - bill
 bag - big - bug
 bin - bun - Ben

-Focusing on final vowel sounds:

cab - cap - cat - can
 hit - hip
 bib - big - bin - bill
 bus - bug - bud - bun
 hat - half - ham
 rat - rack - rag

Variations: -lotto boards can be made from pictures of the above
 -Teacher tells story using groups of words focusing on a particular sound. The children take a picture when they hear the appropriate word. The children can then retell the story using the picture cards as cues. EXAMPLE: Billy couldn't find his sock. He couldn't find his block or clock or rock either. Someone must have picked the lock on my door and taken them, he decided.

To help the child focus on hearing specific words in sentences:
 Action songs, stories and fingerplays can be used.

Variations: -Each child listens for a different word and relates the associated sound to that word.
 -Increase the number of words and actions to remember

READING READINESS PROGRAM

AUDITORY SKILLS

- give each child a word to remember. Tell a story in which the children contribute their word upon cue.
- give each child a set of pictures (or distribute a set among a group of children) depicting a story sequence. Tell the story as the children find and sequence the pictures as he hears the cue words.

To focus on auditory memory of words and word sequences: Read rhythmic stories (Dr. Seuss "Green Eggs and Ham") and have children repeat short sequences in unison. Vary pitch, volume, speed, and length of utterance for variety.

Variations: (1) Sentence Repetition: child or teacher says sentence which others repeat.

(2) Teacher or child says two word phrase and others repeat it backwards.

EXAMPLE: Jill jumped.
jumped Jill.

Blending sounds to make words: Place pictures of animals and objects with multisyllable names in front of the children and tell them you will say the name very slowly. Ask them if they can guess which word you've said. Some examples: elephant, rhinoceros, hippopotamus, gorilla, octopus, polar bear.

Variations: (1) Move from three or more, to one or two syllable words.

(2) Do activity without picture cues.

(3) Use names of the children as blending words.

(4) Blend one syllable words by sounding each letter.

(5) Children can either think of a word, or choose a word from a pile of pictures, to say slowly for other classmates to blend.

(6) Use picture bingo games and give names of pictures to be covered in syllables.

Developing an awareness of rhyming elements in word:

(1) Provide lots of experience with songs, poems, rhyming sentences.

READING READINESS PROGRAM

AUDITORY SKILLS

(2) Have children fill in rhyming words in familiar songs, poems, and stories.

(3) Develop rhyming sentences with associated pictures. Give the children the first words and have children complete the sentence with a rhyming word.

EXAMPLES: (1) (Picture of boy on ground beside bicycle)
Mell "fell".

(2) Mable set the "table".

(3) Germain took the "train".

(4) Paul sat on a "wall".

(5) Shane piloted a "plane".

(4) Using flannel board pictures of rhyming words, have the children choose from a group of three or more cards, the card which rhymes with a key card.

Auditory Comprehension

Following directions:

(a) "Find me" games.

(1) Use body parts, people, pictures, objects.

(2) Clarify further by descriptive terms.

(a) Find me the red block on top of the round table.

(b) Simon Says.

(c) Following directions on action records.

Sentence completion activities: (1) Provide picture cues. The children choose one to meaningfully complete sentences in stories told by the teacher.

VARIATIONS: (1) Repeat this type of activity with no picture cues. Attempt to construct stories or sentences where there is a choice of meaningful words which could complete the thought.

READING READINESS PROGRAM

AUDITORY SKILLS

EX.: One rainy day, Mary wanted something to do inside so she opened her closet and took out a _____.

- (2) Have children build sentences from a series of picture cards.

Read or tell a simple, short story. Have the children illustrate it; retell it in their own words; listen for the main characters; tell how the story ended; complete a story.

READING READINESS PROGRAM

SYMBOLIC REPRESENTATION - ALPHABET RECOGNITION
OVERVIEW OF ALPHABET RECOGNITION PROGRAM

SPECIFIC LETTER ACTIVITIES

1. Visual discrimination activities associated with specific letters to be taught
 - a. matching activities
 - b. sorting activities
 - c. other
2. Formal introduction to the letters
 - a. teacher gives child letter name - children repeat
 - b. Find me the letter _____
 - c. What is the name of this letter?
 1. Steps a and b are repeated many times and then step c.
3. Letter games using letter names to reinforce new learning and review previous letters.
 - a. advanced lotto: level two and three
 - b. fish

GENERAL SKILL DEVELOPMENT

1. Visual discrimination and matching activities that use complex forms, letters and words. No emphasis is placed on the names of the letters or the words which may be used.
2. Visual and auditory memory activities
3. Writing activities
 - a. coloring
 - b. lines and circles
 - c. tracing
 - d. tracing and copying letters
4. Letter songs

READING READINESS PROGRAM

SYMBOLIC REPRESENTATION - ALPHABET RECOGNITION

VISUAL DISCRIMINATION OF LETTERS

I. Things to keep in mind.

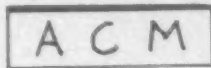
- a. Children should demonstrate that they can match letters or pick out a specific letter from a group of letters before emphasis is placed on knowing the name of that letter.
- b. The names of the letters should be taught in groups. The number of letters in the group can carry in number from 2 to 5 depending on the letter learning ability of each child. By presenting the letters to be learned in groups, you are presenting an opportunity for comparison.

II. Letter Learning activities and games

- a. The letters to be focused on formally are used in a variety of matching and discrimination activities and games BEFORE they are formally presented.

1. Matching activities

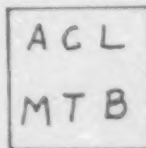
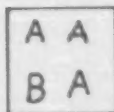
- a. The letters to be focused on are either pasted or printed on a piece of cardboard. The children are given the same letters and put their letters on top of the appropriate letter.



- b. Match letters to an alphabet chart

- c. Lotto games:

1. Lotto boards and cards should be made. By making your own lotto boards, you can individualize instruction. Children who know only two letters can play with children who may know all their letters.



READING READINESS PROGRAM

SYMBOLIC REPRESENTATION - ALPHABET RECOGNITION

a. Level I - Lotto

1. The teacher holds up a card and asks who has the letter M. Although the teacher gives the name of the letter, the children can match by looking.

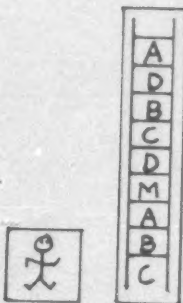
b. Level II - Lotto

The teacher holds up a card  and asks who has this letter. Each child who has the letter and can give its name may then cover it with a marker or a letter card.

c. Level III - Lotto

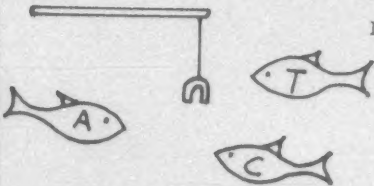
The teacher asks the children who has the letter c, giving no visual cue.

d. Climb the ladder game



1. Each child gets a card which has been adapted to his level. His job is to climb to the top of the ladder. Each player in turn picks up a card with a letter printed on one side. If the children are on the same level a central stack of cards can be used. If not each child can have his own stack of cards. The child moves to that letter, up the ladder either by matching or by matching and giving the name of the letter. The child who reaches the top first wins.

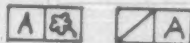
e. Fish



1. Using poles with strings and magnets attached, the children fish for letters (fish cut out of paper with a letter printed on it and a paper clip attached to attract the magnet). The children can keep all the fish they can catch and match to a letter on the board or chart or can name.

f. Dominos

1. Use a combination of letters and colors or letters and pictures or adapt a set we have at the center.



READING READINESS PROGRAM

SYMBOLIC REPRESENTATION - ALPHABET RECOGNITION

- g. After the children have had some experience with matching single letters, move on to letter combinations and words.

2. Letter combination Activities

- a. Many of the activities used above can be adapted for use with letter combinations.
- b. Initially children look at the whole word. It is easiest to begin with words that vary in length and overall length. For example: It would be easier to discriminate the difference between "together" and "ant" than it would to see the difference between "boat" and "some". Difficult pairs of words would be car and bat, no and on, car and cab, etc.
- c. Matching: Each child is given a card with a word or a combination of letters printed on it. They are to find a card that looks just like it from a group of cards on the table, or words printed on a blackboard or on a page.

Samples ranging in difficulty:

I MAP HOUSE A T ICE CREAM

II MAP TREE AN CAT ME

III MAP PAM MAT MFT PAN

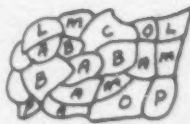
- d. To help children focus on the letters which make up a word children are given word cards and a bunch of corresponding letters. They are to duplicate the word on the card using their individual letters.
3. Sorting activities:
- a. Basic sorting activities can be used to focus on individual letters before a name is assigned.
- b. Sorting can be done with word combinations.

READING READINESS PROGRAM

SYMBOLIC REPRESENTATION - ALPHABET RECOGNITION

Related Activities

1. Copying letters
2. Tracing and coloring
3. Letter songs
4. Letter pictures



Color in sections
marked A or B

5. Learning names
6. Meaningful games using initials: Delivering "letters" which are addressed by initial or names.

READING READINESS PROGRAM

SYMBOLIC REPRESENTATION - ALPHABET RECOGNITION

FORMAL LETTER LEARNING

1. After the children have seen the letters to be learned during matching or sorting games, formal letter learning can be focused upon. This should be done in many very short sessions.

The names of the letters should be taught in groups of letters. The size of the groups depends on the children. For children who vary greatly in ability or in interest or age, it might be wise to take these short sessions up with individuals rather than groups or some of each.

2. 3 stage process

- a. Using two, three, four, or five letters, the teacher tells the children the names of the letters. This is the letter A, this is the letter T, this is the letter M.

Teacher repeats her direct teaching and asks the children to repeat the name of the letter.

Teacher repeats above changing order of presentation.

- b. The children are given the name of the letter and are asked to find it. Show me the letter A. Find me the letter T.
- c. In this step the children supply the name of the letter. The teacher may ask what letter is this? At first all the letters may be in view, so the child who knows one may use a process of elimination in finding and naming letters. Then letters are presented individually.

After the first letter learning lesson an ideal letter learning session would make use of two or three of the steps above for two or three one to two minute sessions. The remainder of the time would continue using games and tasks which had the letters introduced in them for those children who can easily generalize and transfer information.

READING READINESS PROGRAM

ALPHABET RECOGNITION - PROGRESS ANALYSIS (evaluation)

1. Matching letters and letter combinations

- a. Use cards from envelope no. 1. (yellow cards)

Teacher places square, yellow, single letter cards on the table so that each letter is right side up and facing the child. Using the rectangular yellow cards the teacher asks the child if he can find the letter which she holds up. The children are to point out the matching letter from those on the table.

A E F K X S Z

- b. Matching single letters to letters on a board. The teacher places the yellow card of eight letters in front of the child and asks him to point out the letters which she shows him on his yellow card.

Holding up the letter "U", the teacher asks the child to find the letter that looks just like this on your card.

U P Q

- c. Matching letter combinations

Use red rectangular cards in envelope number 3. Those 3 cards with a "t" printed on the back are the teachers cards. Place the other 5 cards down on a desk in front of the child. Place the cards right side up. Ask the child to find the card on his desk that looks just like the one you show him.

Present the cards in this order: NO TL CAB

2. Visual Memory of Letters

ENVELOPE number 4

- a. Place the yellow square letter cards on the desk in front of the child in the proper position. The red rectangular cards are for the teacher. Use the red card with the letter "S" on it to acquaint the child with the task. Tell the child to look carefully at the card you are showing him because you want him to remember the letter on it. Make sure he looks at the letter carefully. Then put your card out of his sight and ask him to find the letter he saw on the card from the group of letters on his desk. If he makes a mistake bring out the letter S again and help him to find the right letter. If the child has trouble, use the letter "G" to teach the task again. Then present the letters in the following order asking him each time to look closely at the letter or letters and to try to remember what he sees. Then remove the card from his sight and ask him to find the letter or letters which he has seen.

S G H AI MD ERE

READING READINESS PROGRAM

ALPHABET RECOGNITION - PROGRESS ANALYSIS

3. Associating the letter symbol with the letter name.
 - a. Place the letters ABCFJLMNOPSTX from envelope number 5 on the table in the proper position and in random order in front of the child. Ask the child to find you the letter: A C O B T M J
The child gives you each letter as he finds it.
If the child hands you the wrong letter or does not know the letter, place incorrect letters back on the table and continue to the next one.
4. Recognition of letter symbol and letter name.
 - a. Use the same blue cards from envelope number 5. Shuffle the cards so that they are in random order. Hold up each letter to the child and ask him "what letter is this?" or "what is the name of this letter?" Place the letters in two piles. Those which he knows and those he has named incorrectly or has not named at all.

Matching letters:

A

15

the

K

X

2

21

Matching to
board

 $\bar{u}$

P

Q

Visual Memory

5

G

H

AI

M

ERE

Associating letter symbol
with letter name

A

C

O

B

T

M

J

Recognition of letter
symbol and letter name

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

FORMAL READING PROGRAM

OVERVIEW OF THE LANGUAGE-EXPERIENCE APPROACH TO READING

(Based on Stauffer, R.C., The Language Experience to the Teaching of Reading)

1. The experience reading chart

- a. To introduce the concept that reading is just talk written down
- b. To give the child a choice of a meaningful reading vocabulary
- c. To provide a medium through which the child develops a sight vocabulary and learns word attack skills (word recognition skills)

2. The word bank

- a. A listing of words which the child has demonstrated that he knows or has known at some time
- b. Used for reviewing vocabulary, for phonics or word attack skills development, for comprehension activities and for alphabetizing activities
- c. The picture dictionary
 1. Used so that the children can find out the meaning of words they may have forgotten
 2. Made by children

FORMAL READING PROGRAM
LANGUAGE EXPERIENCE APPROACH

THE EXPERIENCE READING CHART

The reading charts are dictated to the teacher by small groups of children. The topics of such charts may range from school experiences; weekend experiences; fantasy or may be based on stories; records; etc. The teacher helps the children to follow a train of thought and to organize their ideas. Her job is also to write down what the children say with no teacher corrections. The teacher may write it on the board or on large lined paper. She should print using the form of the letters decided upon. She should print carefully, emphasizing the left to right motion; the capital letters and all punctuation. She should read the words as she writes them.

Experience charts are first made in groups but should eventually be done individually; although groups can work together on dictation at any time.

1. Each child can write about his own interests and experiences in his own way; using his own words; thus making it easier for him to remember the stories.
2. The child can acquire a reading vocabulary at his own rate. (not at the rate set by another child or a group)

PROCEDURE FOR EXPERIENCE CHARTS

1. Children dictate a story. (short - 3 or 4 lines) Include title.
2. Teacher prints the story carefully using appropriate letter forms; capitalization and punctuation either on the board or on a large sheet of lined paper attached to the board or a vertical chart holder.
3. Teacher reads the story to the class, pointing quickly and briefly to each word.
4. The teacher and the children read the story together once or twice with the teacher pointing to the words as before.
5. The names of the children who dictated the story should be printed on the bottom.
6. The children illustrate their story. Either the teacher or the child may title the picture by copying the title from the chart.
7. Reread the chart to the children.
8. The teacher and the children read the chart together.

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LANGUAGE EXPERIENCE APPROACH

9. Each child is given the opportunity to read the chart alone with the teacher.
 - a. After the child is familiar with the story cue him to the words with their initial sound or syllable; and then the full word when necessary.
 - b. Print isolated words on the board and have the children find the word on the chart.
10. Copy the story so that each child has his own copy. Story can be attached to illustration.
11. Story should be reread as a group and then individually with each child at some time during the day. Words the child knows should be underlined. (Eventually the child will independently underline the words he knows.)
12. For the next few days ignore the chart and do comprehension activities and review some vocabulary words. (See list of suggested activities.)
13. After an interval of a day or two; the teacher and the child reread the story again underlining words known. Some words may be underlined twice. It is suggested that the words be underlined in different colors so that words recognized after a two-or three day interval can be noted.
14. Words that are underlined are then isolated in a "mask" and the child is asked to identify it. If he can, the word is added to his word bank and to the picture dictionary. (To be explained elsewhere.)
15. Stories which the children have written should be made available in their room for them to read at any time. There should also be a copy for their desk and for stories they can read completely; copies should be sent home.

REMINDERS

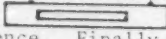
1. Children who do not know a word should be told by the teacher and should not be made to guess.
2. Just because a child knew a word on one day; one should not expect that he must know the word the next day.
3. Most important - children should not be pressured while learning to read: Children who have difficulty should be helped by giving them additional activities on their level if they are interested.
Children who are not interested should not be required to participate.

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BUILDING A WORD BANK

A word bank is simply a collection of all the words the child knows. Each child should have his own file of words for each child will have committed different words to memory.

Each child has a copy of the story he dictated or the one that he helped dictate. The story is reviewed many times as a group with the teacher, alone with the teacher and/or with other children. Various activities relating to the experience chart have been done. Children begin to recognize words. At first they "guess" the words when the story is read as a whole, or they remember the title of the story, or the name of the person or animal or place that the story is about. They begin to further notice or differentiate words as the teacher points to different words as she reads or as the children match or pick out specific words. Further emphasis is placed on the words as the teacher uses a window card or mask  to isolate the different words as she reads them in sequence. Finally, the children can recognize some words when a window card is used to pick out a random word for identification.

Children take their own copies of their stories and underline those words which they know. Their knowledge of the word is checked by the teacher who may use a mask to isolate the words known. Each child can be given a mask of his own to check for himself those words he knows without the help of position or context clues.

The teacher can help the children to develop their sight vocabulary by building sentences from words the children already know and using certain words to which they have been introduced as a part of those sentences. Words can be written on the board with the children picking out those they know, putting them in sentences, and then focusing on some of the other words in much the same way. Lotto games in which the question "Who has the word _____" is written on the board and the children find their words from the written instructions. Of course the sentence is read aloud before proceeding to the next word.

At any rate, words that are known to the child are placed in his word bank.

INFORMATION ON WORD BANK

1. Every word underlined and recognized is printed by the teacher, on a small card, and is added to the word bank.
2. At the beginning, words are placed randomly in the word bank. Once the number of words exceeds thirty, you may want to help

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LANGUAGE EXPERIENCE APPROACH

the children alphabetize their words. You could use index cards or envelopes which have the initial letter printed in both capital and lower case form on the outside. These cards are alphabetized and then the word cards are included.

3. The words in the word bank should be reviewed frequently.

ACTIVITIES BASED ON WORD BANK WORDS

1. Locating word bank words in other places: newspapers, magazines, old books. These words can then be cut out and pasted singly or in sentences on sheets of paper.

Preprimers can also be used as a source for finding known words. Children like to be able to find words they can read.

2. Locating pictures of words in the word bank. Cutting them out and pasting them on tagboard of flashcard size. The word can be printed on one side and the picture pasted on the other. The children can then test themselves and each other.

3. Creative word usage: Words in the word bank can be arranged and rearranged on a desk top or a word card holder to make sentences or to ask questions of others. Words not known or words not contained in the file can be added by the teacher. From questions, the children can build statements and stories. They can answer very general questions a teacher might ask by building the answer on their desk. Extra copies of common words should be made up by the teacher.

A teacher might ask: Tell me something about a house.

4. Word recognition skills can be focused on by using words in the word bank. The use of word attack skills to unlock a word not known at sight involves the use of context of meaning clues, phonic or sound clues and structural or sight clues.

- a. Phonic or sound clues - Find a word in your word bank that begins with the same sound as "MOTHER". Place it on your word card holder or on the desk. Now find a word that begins with the same sound as "BUTTER". Place that on your desk. The teacher then says a series of words, some beginning with the M sound and some beginning with the B sound and the children point to the word on their desk which starts with the same sound as the words said by the teacher. Letter names can be re-emphasized at this point.



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OVERVIEW OF GENERAL PROGRESSION

1. Rhyming
 - A. Games
 - B. Formal Activities
2. Initial Consonant Sounds
 - A. Games
 - B. Formal Activities
 - C. Associating the Sound and Letter
 - D. Word Family Activities
3. Initial Blends
 - A. Formal Activities
 - B. Associating the sound and letters
 - C. Word Family Activities
 1. Single Consonant endings
 2. Structural Variation
4. Digraphs
 - A. Formal Activities
 - B. Associating Sound and Letters
 - C. Word Families
5. Vowel Keys (to be presented)

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RHYMING - GAMES

Supplementary activities - or activities for those children not yet at the reading stage.

1. Rhyme completion games using picture and context clues.

Ex. Fred Mall bounces a _____



2. Placing pictures that rhyme together. You may use your own pictures or those available for the flannel board.
3. Hearing rhymes, poems, completing rhymes without clues, songs.
4. Paste a picture on each can to be used. The children will use rhyming to solve the puzzle.



Poker chips, tokens from the Peabody kit, teddy bear counters, raisins, small trucks, etc. may be hidden under one of the cans. While the children hide their eyes. Clues are given by the teacher in rhyme.

Early: I will tell
I say you ring the _____.

Later: The truck is under the can that
rhymes with knee.

5. Pictures of things that rhyme are mounted on cards or the flannel board cards can be used, and cropped. The cards should vary slightly in size so that all rhyming words should be the same size. For example all the words which rhyme with "all" are cut to the same size and the words which rhyme with "ring" are all cut to a slightly different size.

Two, or more, boxes are used for this sorting activity, each with a slit on the top matched to the size of the appropriate card.

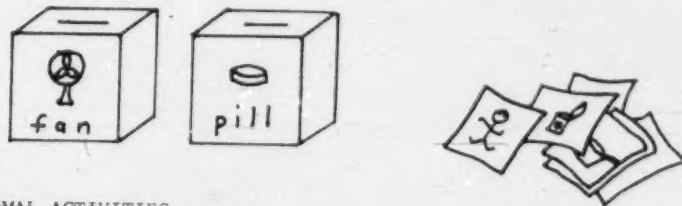
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Place a picture or a sight vocabulary word on the front of each box. (Both may be used) With the teacher's help, at first, the children sort their cards by rhyming each picture card into the appropriate box.

After all the cards are sorted, the cards in each box are taken out, lined up and named to focus on the rhyming sounds.

If this is to be used with the teacher only, the cards may all be the same size. If children are to do this alone, varying the size of the slit on the top of the box will make this more of a self correcting activity.

RHYMING - FORMAL ACTIVITIES

1. To determine if words sound alike:
 1. I'm going to say a word and you tell me if it sounds like Pat. Bat. Yes, bat sounds like Pat.
 2. Say a series of words and ask the children to choose which ones rhyme with a prescribed word. If they are words which are to rhyme with the word "tree", a picture might be provided so that you are sure the children remember the word.
 3. Provide two sight vocabulary words. Ex: "me" and "bat". Then say a series of words. The children choose which of the two sight words, the word the teacher says rhymes with.

Initial consonant sounds, blends, and digraphs (based on progression presented in the teacher's guide to Around the City, Bank Street Readers)

Progression: Move from rhyming activities, to initial consonant sound activities, then to consonant blends, and then to digraphs.

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Games and Activities

1. SEE: Phonic Analysis from the teacher's guide of Around the City
 1. Hearing Initial Consonant Sounds p. 226
 2. Visual Recognition of Initial Consonants p. 227
 3. Initial consonant games and exercises p. 229

Formal Activities

2. Begin with words which have a single consonant sound.
Ex. "T". I am going to say some words and you tell me which ones start like the word "tiger". Discuss how your mouth goes to make the "t" sound and have the children say it a number of times before you begin. You may provide a picture of a tiger to help the children remember the key word.
3. Provide two words, pictures or both beginning with very different sounds like marble and ball. Then say a series of words and have the children choose which of the key words begins like the word or picture you present.
4. Set up columns of known words for selection and discrimination

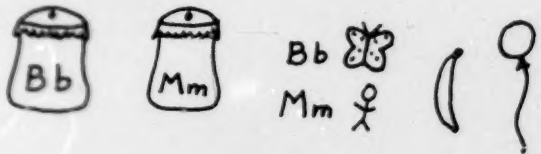
town	man	ball
turtle	turtle	turtle
marble	marble	marble
balloon	balloon	balloon

1. Read each list with the children asking them to identify whether the word turtle begins like town. If the word in a list begins like the key word it is circled. Repeat for all the words in all the columns.
2. Ask the children to underline the letter that represents the beginning sound.
3. Ask, to reinforce, or teach, the name of the initial letter.

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5. To reinforce the learning that has been taking place in the direct teaching situation, other games which the children may use themselves, in groups, or in class may be used.
1. Ex. Sounds focused upon during the week can be focused upon by the children without direct help from the teacher. Pictures representing objects which start with the appropriate sounds are collected. Paper bags are attached to the wall; the letter (capital and small) representing the sound is printed on the front. Children can work singly or together to sort pictures into the bags. The teacher can check this or the children can check their own if the teacher makes up a check sheet.



Go from single letters to blends.

1. Common letter blends are: bl, br, cl, cr, dr, fl, fr, gl, gr, pl, pr, sc, sl, sk, sm, sp, st, str, tr.

(Many phonics programs teach the l blends (bl, cl, fl, pl, sl), and then the r blends and so forth)

2. You may use the same procedures as above for the formal introduction to the blends. Nonreading activities, the same as those used for the consonants are also appropriate for blends.

When blends are first introduced use only blends in the rows and columns. Do not mix blends and single letter beginnings or blends and digraphs in the same exercise.

stay	tree	drive
step	brown	sleep
sleep	trap	plow
plow	clown	drop

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- a. Read each list with the children asking them to identify whether the word step begins like the word stay. Does the word sleep begin like the word stay? Circle the words in each column that begin like the word on the top.

Focus on the sound rather than just the letter.

- b. Have the children underline the beginning sound in these words.
- c. Review the letter names.

Go from blends to digraphs.

1. digraph: Two letters which when placed together make one sound. (The separate sounds of each of the letters involved are not heard.)

digraphs: sh, th, ch, ph, wh

1. Use the activities above in the same way to introduce digraphs.

Associating Letter Sound with Letter Name

1. This is begun after the children have had some experience with initial consonant sounds activities. The teacher says a word and the children tell what letter the word begins with. The teacher begins with words which the children can read and can write, words which they have spelled before. Then write the words on the board and have the children confirm their answer or correct themselves if they were wrong.
2. Children might be asked to find a word in their word bank that begins the same way as the word "boy". The letter name can then be emphasized.

Be sure to add the child's own name to the word bank and use that solely if that is the only word he knows.

3. Ask the children to supply their own words that start with a certain sound or letter.

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LETTER SUBSTITUTION OR WORD FAMILIES

1. The teacher begins with words which the children know to help them see the relationship between the words presented. The words are always written on the board or on paper, and are always placed in columns so that the words can readily be compared. In the beginning clues are given to help the children.

EX. Two words the children know are used:
wall and ball

The teacher writes the word "wall" on the board, asking the children what the word is. The teacher erases the "w" replacing with a "b" and says, I'll change the "w" to a "b" and make another word. This is a thing that bounces and you use it on the playground. This word is _____.
The teacher then prints the word wall and under it the word ball and re-explains what she did to make a new word.

The approach above is done with a number of words which the children know. Once they begin to see the relationship between the words, any combination of words may be used.

EX. This is the word "Bill". I will change the b to an h.
What word do I have now. Such an approach could

lead you to use:	Bill	pill
	hill	fill
	will	till
	mill	

2. Common endings used in the primary grades are:

an
at
it
ill
all
old
ake

3. Other endings which build at least 6 words:

ick
own
ap

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4. Word families may be extended to use blends and digraphs once these have been thoroughly introduced and the children have a sound association for these letters.
5. Once the children have become proficient at word family exercises, each may be given his own card which has the consonants, blends, and/or digraphs printed on it. The children use these cards as a guide and can build their own words, writing out words which make sense, or can make nonsense words with others or with the teacher in a group.

Sample Children's Card

b c d f g h j k l m n

p q r s t v w x y z

bl cr fr ph sh sn sw

wh br dr gl pl sk sp th

ch dw gr pr sl st tr cl

fl sc sm str tw

You may use only initial consonants, only blends, only digraphs or any combination of the above. In the beginning use only single consonants. You can always add to the card. Too many elements at once can tend to be confusing.

Once children show some proficiency in beginning consonant substitutions, focus on consonant endings.

Example:

can

cad
cab
cat
cap

sat

sad
sag
Sam
sap

his

hid
him
hit
hip

big

bid
bib
bill
bin
bit

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V. Structural Variations

1. plurals
2. verb endings: -s, -ed
3. -ing endings

Such words can be focused on as they come up on the experience reading charts. Once a number have been brought up, the teacher may help the children make distinctions by making direct comparisons between these words and using these endings on words the children already know.

run	paint	rain
runs	painted	raining
running	painting	(rainy)

APPENDIX V. A

PRESCHOOL-MATH/PROBLEM SOLVING PROGRAM

- A. Overview of Concepts and Processes
- B. Concepts
- C. Processes

PROCESSES		QUANTITY	POSITION	SIZE	WEIGHT	CONTRASTING CONDITIONS	FUNCTION	COLOR	SHAPE	GENERAL KNOWLEDGE	NUMBER
PERCEPTION	kinesthetic discrimination										
	auditory discrimination										
	visual discrimination										
	tactile discrimination										
	olfactory discrimination										
	gustatory discrimination										
EVALUATION	comparison										
	contrast										
	matching										
ORGANIZATION	association										
	classification										
	correspondence										
	seriation-time:sequence										
	causality										
	property										
REASONING	pattern										
	analysis										
	synthesis										

Fig. 2.8 Math Problems Solving Program Conceptual Model

CONCEPTS

The following mathematical concepts were focused upon:

1. AMOUNT: all, some, none, full, empty, much, more, most, less, least, many, few, fewer, fewest, a lot, a little, same.
2. POSITION: near, far, high, low, top, middle, below, up, down, on-off, above-below, between, beneath, beside, behind, ahead, under, over, in(side), out(side), on(top of), under(neath), toward, away from, in (front of), in (back of), open-shut, left-right, front-back, next to, through, first, next, middle, last, before, after, by, here-there, beginning-end, forward-back
3. SIZE: little, big, small, large, tall, short, long, wide narrow, thin, thick, deep, shallow
4. WEIGHT AND DENSITY: heavy, light, thick, thin.
5. CONTRASTING OR OPPOSING CONDITIONS: fast-slow, hot-cold, smooth-rough, hard-soft, wet-dry, happy-sad, night-day, light-dark, with-without, old-new, old-young, on-off
6. FUNCTION: usage of objects
what can we do with a stick:
what do you use your hand for?
7. COLOR
8. SHAPE: circle, square, triangle, rectangle
9. UNIT KNOWLEDGE: transportation, food, clothing, weather, time
10. NUMBER: one to one correspondence; measuring; rate counting; counting objects; numeral recognition; association of number & numeral; number value; operation; addition, subtraction, multiplication, division; properties of identity ($A=D=A$), transitivity (If $A=B$, $B=C$, then $A=C$), commutativity (If $A=B$, then $B=A$, associativity $(A+B) + C = A + (B+C)$.

PROCESSES

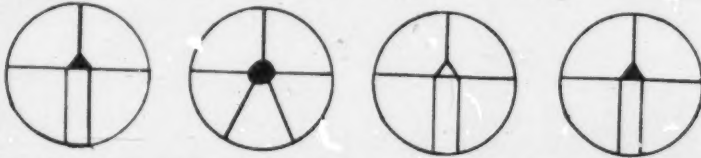
The following mathematical processes were focused upon:

1. Evaluation

Evaluation activities deal with comparison and contrast, the perception of similarities and differences. The child is exposed to simple stimuli such as basic geometric forms and then proceeds to in-



creasingly complex stimuli such as intricate designs or word configura-



tions (nap, map, pan, nap). When he has learned to match items which are exact replicas, he progresses to items which are alike only in some aspects (red hat and red coat) or in which there is only a likeness in quality.



In beginning evaluation activities, one dimension only is involved (shape:   , size:   , color:   ).

Later the child must compare and contrast on the basis of more than one dimension.       Decisions in the early stages

of the evaluation process require observation of tangible properties which are easily perceived through the senses such as size, color, position, number, weight, texture, tone. Decisions at a more advanced level require discernment of abstract likenesses such as function or cost.

When a child is asked to find an object which is similar to another, a limited number of available choices which are grossly different from one another will make the selection easier. As he develops, the child will be presented with increasingly finer discrimination tasks in which there is an array of alternatives closely resembling one another.     The ability to perceive likenesses and

differences is enhanced by experiences which encourage intensive physical and verbal investigation of the attributes of the objects to be evaluated.

2. Organization

Another process which is essential in a child's intellectual development is that of organization, or the structuring and systematizing of a group of elements into a whole. Once perceived, the sensory impressions must be put together in some meaningful way for the child to act upon and adapt to his environment. Experiences which provide the child with opportunities to practice association, classification, correspondence, and seriation of his environmental elements will help foster the growth of organizational abilities.

Association. By association the child learns to connect ideas in thought. From past experiences the child may associate a stove with burned fingers or the preparation of his bottle and feeding time. A view of his mother's face may cause him to expect a reprimand or punishment if he is just about to pull the cat's tail or reach for and empty the cookie jar. He learns what things are connected with what other things and how to seek them out or avoid them. The child begins by relating concrete and physical impressions and progresses to an abstract and verbal level. As his experiences in, and interaction with, elements in his environment expand, the child builds up an ever-growing and modulating network of associations.

Classification. The child may also organize elements by classification, grouping objects or events by a common property. Grouping skills begin by adding objects one by one. In preliminary sorting activities an example or a tangible clue (outline, shape, color, texture) appearing on the outside of the box may help the child decide which objects go together in a group. To help the child discover his own rules for sorting objects, he is given gross discrimination tasks in which the sorting criterion is obvious to the child (a matching set of dolls and a matching set of airplanes).

Objects first differ in only one dimension. A gradual progression leads to objects such as a block varying in three dimensions -- size, shape, color -- which can be sorted in more than one way. The child is encouraged to tell everything he can about an object and expand his knowledge by probing as to color, size, shape, use, probable location, composition and other properties. The child is encouraged to verbalize the rule he is using while sorting: How are these alike? Why are these put together? The child may thus remind himself of the criteria he has chosen in order to maintain consistency as he adds members to a group. A non-member may be introduced to the group and the child is asked which one does not belong and why. The child is encouraged to change the criteria occasionally by emphasizing all attributes of the blocks.

Children begin by forming groups in which all members are alike -- a group of all beads and a group of all blocks. Then groups which include unlike members (all kitchen utensils, all flying things) are sorted out. The child first considers immediately recognizable

qualities (such as color) and then properties which require experimentation or abstract thinking (can it fit in a cup?). The child may be asked to select some "like this" and some "of another kind" from a group of objects in which each differs greatly from every other one.

Sorting activities may require use of the sense modalities of sight, touch, smell, taste, or hearing. Classification develops through identification of object properties, matching properties, grouping by an increasing number of properties, recognition of both members and non-members of a set (complementary classes -- trucks and vehicles not trucks), separating sets into subsets, comparing all-some relations, abstracting the common property of a group of elements, abstracting a larger group to which the elements belong (beagle dog animal living thing), finding other objects with that property, regrouping the same objects or changing recognizing that any element may be a member of more than one group or class, determining objects which are members of two or more intersecting sets or which possess the property of each set, and making all possible combinations of a given number of elements.

Correspondence. A child may also organize the elements of his environment by putting them into correspondence with each other. One-to-one correspondence refers to the process of matching each member of one set with one and only one member of another set so that no member of either set is left unmatched. A relationship thus exists between the two sets such that pairs can be removed (one member from each group) until both sets have been simultaneously exhausted (Hyber and Woods, 1964).

A child begins by matching up items for which there is an obvious one-to-one relation, such as shoes and feet, hats and heads, buttons and button-holes. One shoe cannot be put on two feet; two shoes cannot be put on one foot; each foot should have a shoe. Later he can match up sets of objects for which there exists no such obvious relationship, such as beads and blocks.

The child first learns to establish equivalent sets. He is asked to put out as many bones as there are dogs in a model row; each dog must have one and only one bone. He is then asked to make judgments and give explanations: Are there as many dogs as bones? Are there more bones or more dogs? Why?

Model:



Child:



At first the child may put out a row of bones which is as long as the row of dogs, one in which the beginning and end come out even with the beginning and end of the other row regardless of how many are within that row.



Later he learns to put the objects in one-to-one correspondence, matching each bone to a dog and making sure that no dog is without a bone and that no dog has more than one bone. At this point the child is able to form equivalent sets or groups with "just as many" or "the same number" but might say that there are more of one or the other if the spatial relation is changed by spreading out one row to give the perceptual impression of occupying more space



or pushing one row together to apparently take up less space.



With repeated experiences of disarranging objects and rearranging them into their original one-to-one position, the child develops the concept that if he does not add or take away any objects there will still be one and only one bone for each dog even if the spatial relation or configuration has been changed. If the dogs bury their bones in one pile under a blanket and then scatter to their separate houses for their supper dishes, there will still be one and only one bone for each dog when they return and dig them up.

After the child can establish equivalence between two sets of elements, he then learns to re-establish equivalence between the two sets. When a dog is added, he must either add a bone or take away a dog; when a dog is taken away, he must either take away a bone or add a dog.

The child can also establish a one-to-one correspondence between objects by adding or taking away an object at the same time and each time the teacher does so. The child discovers that if he adds one after the teacher has stopped, or if he begins one turn behind the teacher, if he skips a turn, if he continues to add while the teacher

pauses in the middle of the activity, or adds or takes away two at a time instead of just one, then one set will have more than the other.

After much practice at establishing one-to-one correspondence, the child may proceed to many-to-one and many-to-many correspondences.

Seriation. Seriation is the process of arranging a group of elements or events in a connected succession. Items may be ordered by continuity in time, by an increase or decrease of a property, or dimension, or by contiguity in a repetition pattern.

Ordering by time. This includes activities which involve simple sequencing or chaining of events by time intervals at which they occur, determining which of the given events happens first, next, last, and relating them in terms of before and after. Ordering by time also includes activities which determine causality, the interrelation between a person, thing, or event and the result that it brings about; one thing happens because something else happened first. Here one event does not merely precede a subsequent event; it directly causes it to occur. Repeated experiences and trial and error investigations are required to establish this relationship. An infant does not automatically know that the sound he hears coming from his rattle is brought about by the shaking action he has performed. In attempting to make the sound again the infant may try an array of behaviors such as kicking his feet, flailing his arms, or emitting his own noises at the rattle. Likewise he will only begin to develop the concept that if an object is dropped, then it will fall after he has practiced repeatedly dropping his toys, blanket, spoon, bottle, shoe, or other objects and observing the effect produced.

Ordering by Property. Another type of seriation is evident when objects are ordered by an increase or decrease of a specific property. In such instances the relationships are based not on temporal criteria but are established by sensory perception of the relative degree to which an object exhibits a particular quality.

In beginning activities, the child is asked to insert an item or items into a series in which the items at either extreme (for instance the smallest object and the largest object) of the dimension to be considered and perhaps some intermediate examples are already positioned in a row. Later he will be challenged to construct the entire series from beginning to end (e.g., from smallest to largest) and to reverse this order (arrange items from largest to smallest) when asked to begin with the last item and end with the first this time. The child will be given opportunities both to order objects set apart by regular differences

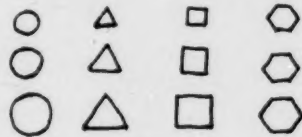


and to order objects set apart by irregular differences.

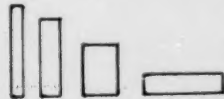


After many experiences with ordering one set of objects along one dimension, the child can practice arranging more than one series of objects (such as mixing bowls, measuring cups, measuring spoons) along the same dimension so that they are in one-to-one correspondence with each other. A still more difficult activity would involve ordering two series of objects by the same dimension (i.e., height) but in a complementary relationship to each other (i.e., dolls and stepladders needed).

When the child has developed some proficiency at ordering objects along one dimension, he can be introduced to objects which can be ordered along more than one dimension, for example by size and by number of corners of a group of shapes.



More advanced activities may involve ordering items by two dimensions with one in ascendance and one in descendance.



At a higher level of ability in seriation by property, the child will be able to draw how the items will look or to verbalize the order before he has actually manipulated and arranged the concrete items.

Ordering by Pattern Activities. Objects can be arranged in a series by ordering them according to their contiguous spatial relations within a pattern. In linear ordering tasks a child is given a set of objects in which each item is easily distinguishable from every other item. He is asked to replicate a model row of objects. He must first be able to select only those items which appear in the model row, rather than lining up all the items he is given. The child constructs his line of objects at a distance from the model row, so that he must go beyond the process of simply matching up pairs of objects and consider the relative position of each object within the series. It is not enough to just perceive that two objects are next to each other;

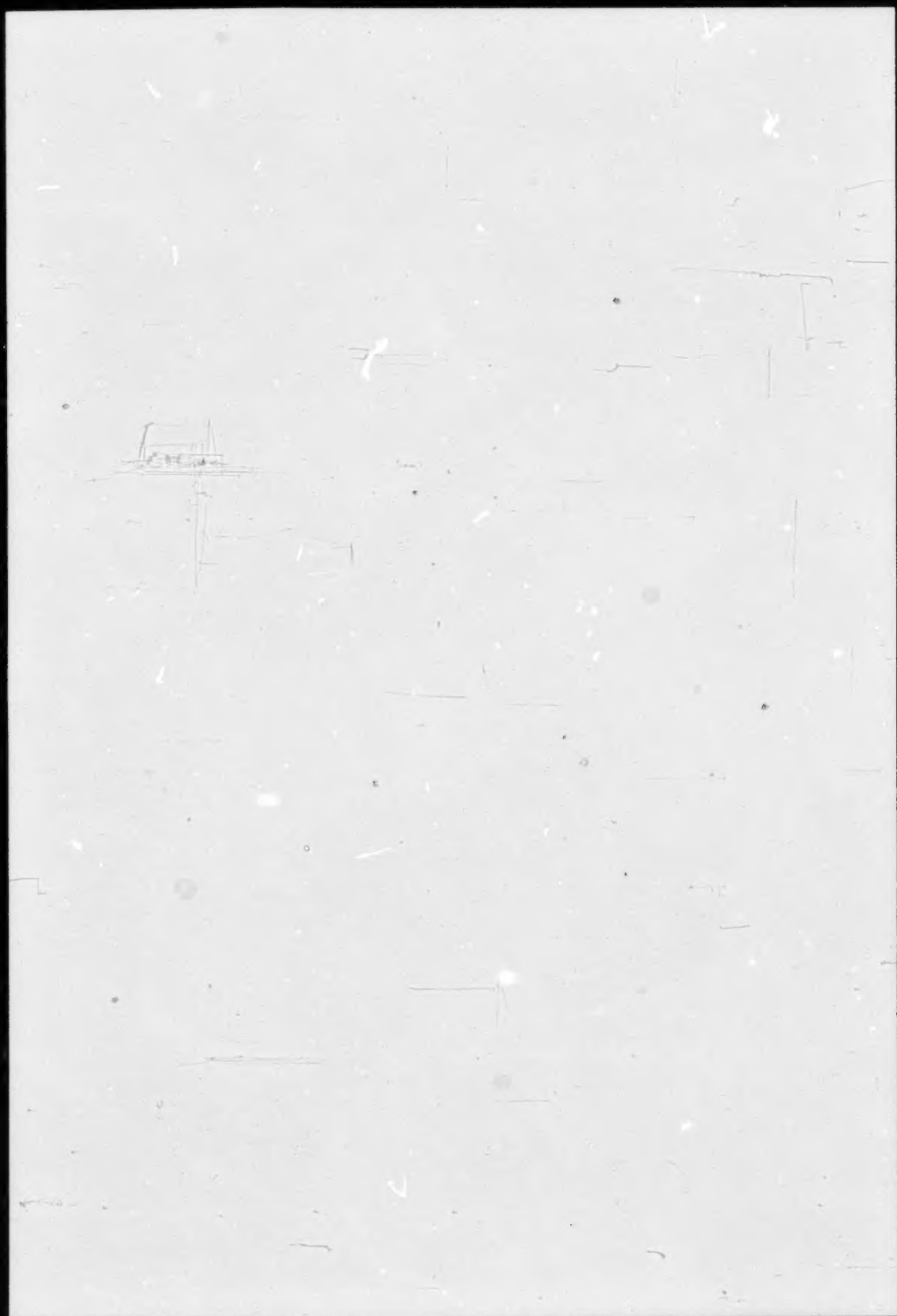
their proximity relationship must be coordinated with those of all the other objects in the row. The child can correct his work by checking for ordinal correspondence between the two rows, the first objects being the same, the second the same, and so forth through the last element of the progression. The child may be asked to fill in a missing object, complete a row, or construct a row from beginning to end.

Variations of ordering by pattern activities involve repetitive successions of similar elements within a row.

3. Reasoning

Analysis. Analysis is the process of separating a whole into its parts and examining the nature, proportion, function, and relationship of these variables. When an infant is introduced to a new object in his environment he is likely to use multisensory techniques of investigation. He may come to know how his cereal feels, how his blanket tastes, what a spoon sounds like when banged against his feeding tray, what mud smells like, and what his bear looks like on the inside as well as the outside as his manipulations increase his information about objects. Analysis activities can be encouraged by providing the child with objects which invite exploration -- a closed box with a rattling sound inside, a screw top jar with a toy visible within, an orange to be peeled, sectioned and eaten, a low cabinet drawer filled with objects such as coffee pots which can be taken apart, alphabet soup or fruit cocktail for lunch, a package to unwrap, a picnic basket to unpack, a drawstring bag or zippered, clasped, buckled, purse where favorite toys are kept. Children are encouraged to find out all they can about objects: How does it feel? Does it make noise? What does it look like? Can you smell it? Can you take it apart in pieces? What's on the inside?

Synthesis. Synthesis is the process of putting together parts to form a whole. Activities which give the young child experience in this creative process include stacking blocks in a tower or linking them together in a train, stringing beads, making paper chains, cooking, making modeling dough and mud to form objects, mixing paint, fitting the pieces of a puzzle together, building houses, bridges, kites, boats out of bricks, tinkertoys, and other construction materials, pasting items in a collage, weaving, making designs and pictures with pegs in a pegboard, crayon or chalk drawings, and felt shape compositions on a flannel board. Activities such as these in which the child develops experience with physically combining concrete elements are gradually shifted to synthesizing wholes from parts at more abstract levels of manipulation.



APPENDIX V. B

PRESCHOOL--MATH/PROBLEM SOLVING ACTIVITIES

- A. Perception
 - 1. Kinesthetic discrimination
 - 2. Auditory discrimination
 - 3. Tactile discrimination
 - 4. Olfactory discrimination
 - 5. Gustatory discrimination
 - 6. Visual discrimination
- B. Evaluation
- C. Organization
 - 1. Association
 - 2. Classification
 - 3. Correspondence
 - 4. Seriation
 - a. Sequence (ordering by time)
 - b. Causality (ordering by time)
 - c. Ordering by property
 - d. Ordering by pattern
- D. Reasoning
 - 1. Analysis
 - 2. Synthesis

PERCEPTION

Kinesthetic Discrimination

Perceive movement, position, stress in play with action

Equipment: push and pull toys; balls (throwing, catching, kicking, batting, bouncing, spinning), tops, yo-yos, jump ropes; balance boards, merry-go-rounds, swings, slides, roller skates, pogo sticks, jacks, sleds, monkey bars, teeter-totters, rolling barrels.

Action songs, games, dances, fingerplays: bend and stretch and backing exercises, animal walks, leap frog, jack-in-the-box, jack be nimble, spinning top-turn and stop, crack the whip, open them-shut them, eensy weensy spider, over-under-around-and through, ring around the rosy, London bridge, tug of war, cat and mouse, red rover, Simon says, put your finger in the air, mother may I?, red light-green light, statues, charades, hopscotch, races (3-legged, wheelbarrow, sack, carrying books on head, bead on spoon, rolling, backwards), somersaults, cartwheel, hand and head stands

Obstacle courses (go up the steps, down the slide, through the barrel, over the log, under the rope, between the trees, around the rock)

Determine by lifting which box is full and which box is empty; which box has many blocks and which box has just a few blocks in it; which box has a lot of sand and which box has a little bit of sand

The child draws a circle or face with his eyes shut.

Auditory Discrimination

Experiences with noisemaking toys and activities such as hammering, banging pots with spoons, splashing bath water, rattling objects, musical and rhythm instruments (sandpaper blocks, sticks, triangles, drums), stories and songs involving variations in pitch, volume, quality, rhythm (the Three Bears, Old MacDonald Had a Farm, Going on a Lion Hunt)

"What Am I Doing?" game: A child is blindfolded and listens as another child makes noise by clapping, cutting paper with scissors, snapping fingers, scribbling with pencil, tearing or wadding up paper, **scratching, etc.** The blindfolded child tries to guess the activity by auditory cues and then imitates it.

"Who Is It?": A child guesses which bear -- Papa, Mama, or Baby -- is saying "Who's been eating my porridge?" by vocal pitch used. A blindfolded child guesses the identity of another child by his voice.

PERCEPTION

"What's in the box?": An object is placed in a cardboard oatmeal container or a metal cannister. The child tries to guess what is inside by the sounds it makes as he shakes the container and listens to hear if it is hard or soft, heavy or light, big or little, smooth or rough, round or painted, solid, liquid or composed of many small pieces. This activity can be preceded by letting the child experiment by placing various things -- cotton balls, marbles, water, sand, pennies, dry rice, nails, macaroni, beans, flour, cereal -- in containers and listening to the sounds that are made.

Match a sound - find 2 containers which have the same thing in them by finding 2 which make the same sound (2 containers should be left empty) open and look to check.

Tell the story: The child listens to taped or recorded noise sequences such as running feet, crash of falling things, crying; or frying bacon, scraping toast, pouring milk, tinkling dishes and running water; or opening door, sound of rain, closing door; hammering and sawing, dog barking and makes up a corresponding story.

Pitch stairstep: The child discovers different pitches by filling glasses with different amounts of water, and arranges them in ascending or descending order.

Musical chairs - Children move around line of chairs (1 less than there are children) until music stops or changes in quality at which point each tries to occupy a chair.

Copy me - Child and teacher each have set of resonator pipes or toy xylophones, teacher and child take turns copying each other as they strike a note or series of notes. Copying activities can also involve copying rhythms.

Changing sounds: After the child is given time to explore sound-making on his own, he is asked to demonstrate variations -- fast, slow, loud, soft, fast and loud, fast and soft, slow and loud, slow and soft. When resonator pipes, xylophones, or piano are used, sound combinations may include 3 requirements such as fast and soft (quiet) and low or slow and loud and high.

"Doggy, doggy where's your bone?": Children sit in a circle; "dog" sits in middle, eyes covered and listens as one child gets up, steals bone from center and returns to his place. The "dog" must then guess by direction of the sound of footsteps who stole his bone.

Are these two notes the same? Are these two chords the same?

"Duck, Duck, Goose" game: Child runs when the word goose is heard.

Do what "Simon Says" when the words are heard, even if miscued visually.

PERCEPTION

Listen to sounds (claps, finger snaps, knocks, down beats under the table or behind a screen). How many did you hear?

Tactile discrimination

The child is shown a number of familiar objects or shapes. One of these is placed in a box with a hole in one side such that the child can get his hand in but cannot see inside. He must identify what is inside by feeling or he may tell all he can discover about it by touch (it is hard, long, skinny, it has a sharp point on one end and a soft tip on the other end) and let the other children guess what it is. When several items are placed in the box, he may be asked to reach in and bring out a specific item.

Material swatches of various textures (corduroy, velvet, silk, burlap, felt, rough tweed, dotted swiss) are placed in a bag. The child feels a sample and then reaches into the bag to feel for its match.

The child puts his hands behind his back and an object is placed in each hand. Which hand has a marble; which has a button? Which hand has the big button; which has the little button? With his eyes closed he tells how many pennies are put in his hand or how many rings are slipped on his fingers.

The child tells which covered cup has ice cream or soup, cocoa or juice in it by feeling the temperature.

Explore the environment by feeling hard, soft, sticky, wet, dry, slippery, smooth, grooved, rough, elastic, fuzzy, spongy, stringy, hot, cold, sharp, pointed, rounded, brittle, wrinkled, lump, solid, liquid properties. Discover the effects of heating, pressing, freezing, wetting, cooking, drying, sanding, rubbing and other physical processes on the textures and consistencies of materials.

Blindfolded child tells position of block in relation to cup (in, under, behind, beside, in front of, on top of) by touch.

A blindfolded child identifies another child by touch.

A blindfolded child is asked to perform a simple activity such as putting an object in a closed box or opening a door and walking through it.

Olfactory discrimination

Identify smells in environment (baby oil, gasoline, popcorn, smoke).

Identify objects under cans with holes punched in the top by smell or find which can has the soup, pepper, orange peel, onion, under it.

PERCEPTION

Olfactory discrimination contd.

Match contents of containers with holes in the covers by smell.

Gustatory discrimination

Sort sweet, sour, bitter, salty, hot or spicy foods.

What is it? Identify objects by taste only (Open your mouth and shut your eyes ---)

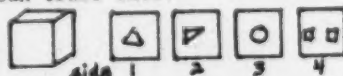
Determine which is sugar, which is salt by taste.

Visual discrimination

Recognition of objects when varying their positions in space: -When presenting the bottle to the baby, the teacher hands it to him with the nipple facing in different direction. The child is required to turn the bottle in order to receive the milk.

Visual image of the whole object when only part is visible: - A desired object is placed behind a box on the floor so that a small portion is visible. The child is given the opportunity to guess what it is and to go get it. - Or to guess what is in a wrapped package by the outline.

Visual perception of size and shape relationships: - Take a good sized carton and cut a circle out of one side and a small square out of the other. Place a ball inside the closed box and let the child try to remove it. - Make a box which the child can crawl into. Make only one exit that he can come out of.



Could an elephant or a spoon get into this box?

Visual Attention: - Hide an object under one or two boxes placed on the floor. Call attention to where the object is hidden. Visual cues may be given by setting up one large and one small box or by color cueing. Have the child find the hidden object.

- The teacher uses large colorful charts on a stand. Each chart has 8 or 10 different objects pictured. The teacher begins a discussion of one of the objects and asks a child to point to the one they are discussing.

- Color perception - match blocks similar in all other aspects but color: What else in the room is this color?

- Perception of position - show me the picture where the cat is under the chair. Where 2 girls are on the slide and one girl is off the slide.

PERCEPTION

Visual discrimination contd.

- Perception of opposing conditions - Which boy is happy? sad?
In which picture is it hot? cold?

- Perception of number - Number bingo - one child holds up the
bingo card and says the number, the other children mark their cards
if they have the right number.

- The teacher lays out large number cards 1-5 on the floor on
the opposite end of the room. She says a number, the child goes
to the cards, finds the number and brings it back to the teacher.

- Here are two beads, two blocks, two fingers, two cookies, two
pennies; which box has two toys in it?

Perception of object in configuration - Showing the child large picture
or design cards. Find a circle in this design. Find a flower in
this picture. What is square in this picture?

Perception of similarities - How are these two rabbits the same? How
are they different?



EVALUATION

Concept

Same-
Different

Are these two the same or not the same (different)?

Find two that are the same (matching); find two that are different.

Find all the ones that look like this.

Which one does not belong (is different)?

How are these the same? How are they different?
(Consider groups of apparently very dissimilar objects in finding likenesses and very similar objects in finding differences)

Which one is the most like (or different from) this one?

Find items the same (or different) in one way, two ways, three ways.

Find matching pairs or sets in environment (shoes, buttons, eyes, chairs, eggs in carton).

Identify mirror images.

Complete an analogous relation. (A bird lives in a nest; a boy lives in a _____).

Complete a matrix by filling in an object which matches two dimensions.



Reproduce a line design.



Create a pattern similar to a model given the same elements and given different elements.



X U X

EVALUATION

Concept

Size Compare two items alike except for size - beginning with gross differences. This is a big dog. This is a little dog. Show me the big dog. Which dog is this? Here are two balls. Which is big? Which is little?

Compare more than two items. Here is a big dog, but this one is even bigger, and this is the biggest of all.

Compare a middle-size object to a smaller object and ask which is bigger (smaller)? Then compare the same object to a larger one and ask now which is bigger (smaller), demonstrating that size is relative to the object compared. Compare all three objects and ask which is the biggest (smallest)?

Is this button bigger than a penny? Is it bigger than a plate? Is it small enough to sit in a pocket? Is this box big enough to hold a spoon? Could you sit in this box? Which is bigger, an elephant or a loaf of bread? Which is smaller, an apple or a pear?

Show me a ball that is bigger than this one but smaller than this other one. (Expand on these activities by considering other dimensions by which objects may differ in size (big, little, small, large, deep, shallow, tall, short, long, wide, narrow, thin, thick, fat, skinny).

If Ricky is taller than Tony and Cathy is shorter than Tony, who is the tallest? the shortest?

Compare size of hands, footprints. Measure by matching clothes against body for size, wrapping paper to box, blanket to bed, cloth to table.

Fit things into containers (crayons in box, hand in glove, feet in shoes) too big, too little, just the right size.

Make a block train, bead necklace, as long as this one. Make a tower as high as this one. Find a stick or string as long as this tower is high. Build a tower on the floor as high as one on the table. Lift tower to table - how many blocks in each? Who is taller, the short doll on the high step or the tall doll at the bottom of the steps? What if the tall doll walks up and the short doll walks down to the same level?

Draw the biggest (smallest) button. Draw a button the same size as this one. Draw a circle as big as a pea, a penny. Draw a line as long as this one. Draw the shortest, longest stick.

EVALUATION

Concept

Match up two sticks of equal length. Move them into different positions. $\equiv \equiv \backslash$

Now which is longer? Return to original position.

Match up two strings of equal length. Change the pattern. $\overline{w} \quad o \quad c$

Quantity

Now which is longer? Straighten strings out into original position. Cut one of two equal length strings in pieces. Which pile has more string? Repiece. Cut other string into larger or smaller pieces. Which pile has more? Repiece.

Cut one of two equal area papers into jigsaw pieces. Which pile has more paper? Repiece on top of whole paper.

Cover paper squares with blocks. Remove blocks and rearrange squares. Is there room for as many blocks?

Make a design out of felt shapes. Rearrange into another pattern. Which pattern has more shapes? Rearrange into original pattern. Make two rows of blocks the same length. Rearrange one row of blocks in a tower, stair step, circle or square. Are there still as many blocks? Return blocks into row form. Spread out blocks in one row and push together the blocks in the other. Which has more? Return blocks to original position.

Which glass of milk has a lot? a little? Which pile of blocks has more? Fewer? Who has less clay?

Quantity
Weight

Pick up covered cans. Which one is heavy or hard to lift, which one is light or easy to lift? Which one is full, which one is empty? Which one has a lot, which one has a little? Can you tell which one is empty by the sound it makes when you tap it? Find 2 cans that have the same amount of sand or same number of bottle caps by lifting and matching weights. Which can has rocks and which has feathers in it? Lift or weigh on two-pan balance scale. Uneven cans to check.

Give this doll many blankets because she is very cold, give this doll just a few because she is not cold. The cold doll needs most of the blankets.

Quantity
Number

Are there more fish or more cats on the flannel board? Put up more cats than fish. Now put up more fish than cats (add fish and/or take away cats). If there are neither more fish nor more cats, there is the same number or just as many of one as the other. Put up as many flowers as turtles. Take the same number of turtles as these; take more; fewer than these. Take a much, more, less clay than I have.

EVALUATION

Concept

Number

Which two sets have the same number of members? Play dominoes by matching numbers of dots.

Are there more dogs or more black dogs? Are there more dogs than animals?

Size and
Shape

Make a shape on pegs with a rubber band. Rearrange pegs. How does the shape change? Roll out a clay snake: What happens as he gets longer? Flatten balls of clay into pancakes. What happens to the size of the pancake as it gets flatter? What happens when bread bakes, corn pops, when an icicle melts, a sweater shrinks, a rubber band stretches?

Shape

Match printing block objects to marks made. Who made these tracks? Match shapes and spaces in containing activities - packing a shopping bag, handling cylinders, cubes, spheres: stacking items on a shelf - which things are stackable and why?; cleaning up, picking up pieces and putting them away into boxes, closets, cans, bags, bowls; filling pieces into puzzle, shape discrimination box, shape sorter.

Quantity

Cooking: measuring and counting cupfuls and spoonfuls; comparing half to whole cups, tablespoon to teaspoon; removing materials from one container to another, mixing together and transforming materials, rolling and cutting dough.

Roll two balls of clay the same size. Flatten one into a pancake. Which has more? Reroll into ball form. Roll ball into snake. Which has more? Reroll into ball form. Cut one into pieces and roll into several small balls. Which has more? Reroll. Amounts can be compared visually or weighed on pan balance scale. Weigh different amounts of clay. Add or take away clay. Reweigh.

Fill two similar containers with two colors of water. Pour one into a different shape or size container or into several containers. Which color water is there more of? Pour back into original container. Where will the water come up to if it is poured into a larger container? What will happen if it is poured into a smaller one? Where will the water level be if the container is tilted?

Place an object in a jar. Cover the jar with cloth. Is the object still there? Uncover the jar. Pour milk or sand into a glass of water and stir. Is the milk or sand still there? Pour sugar or salt into a glass of water and stir. Is it still there? Taste it.

EVALUATION

Concept

Into similar jars with equal amounts of water (and thus the same water level) drop objects of different volume - by size or number - so that the water levels differ. Which jar has more water?
Remove objects.

Number

Can you pour more water into a jar filled with sand, marbles, jacks, sponge cubes, or water? How many cupfuls of water can you add?

Which container holds more? Count out cupfuls or spoonfuls needed to fill it. Which line is longer? Count how many toothpick lengths in each.

Number

Contrasting +
Opposing
Conditions

Does it take more little spoons or big spoons of beans to fill a cup, more big blocks or little blocks to fill a box? Does it take more little rugs or big rugs to cover the doll house floor, more big or little paste-on seals to cover a paper? Can you cover the surface of a big or little paper faster with crayon? Can you cover the same size papers faster with a thin pencil or thick piece of chalk? Does it take more cups to fill a big bowl or little bowl? Does it take more water to fill many cups or a few cups? Does it take more steps to go a long distance or a short distance, more big or little steps to go the same distance?

Does it take more little beads or big beads to fill a string? Can you make more big balls or little balls out of the clay? Does it take longer to run or walk to the door? Will a can submerged in water fill faster with big, little, many, few holes in it? Will sand run through a sieve with big or little holes faster? Which ball will bounce higher, which wagon will move farther - one given a hard push or a gentle push?

Contrasting
or Opposing
Conditions

Which is hotter - ice cream or soup? Which is heavier, an elephant or a mouse? Which is darker - day or night? Which is faster - an airplane or roller skates? Which is straighter - a ruler or a banana?

Position

Tony is next to Walter. Is Walter next to Tony? Michelle is in front of Brenda; is Brenda in front of Michelle?

Cathy has more beads than Ann; Ann has more than James.
Does Cathy have more than James?

Quantity

There are as many dolls as girls. There are as many blankets as dolls. Are there as many blankets as girls?

EVALUATION

Concept

Size, Position Which two of these four objects are closest in size, most different in size? Which two are placed the closest together, farthest apart?

Quantity Number Take the biggest pile of blocks. How many are there? Take the smallest pile. How many are there? Take all, some, none, most, a few, half of the blocks. Divide even and odd numbers of objects in half to form two equal parts.

Number Which would be longer - a train three cars long or ten cars long? Which would be higher - a tower of six blocks or five blocks?

Compare two cards with different numerals and the corresponding number of objects. Which is more - four or two? (Objects should vary in size - for instance two large apples as opposed to four small marbles - so the child will develop the concept of number independent of size.) Using more than two cards, take the one with the most, or the biggest number. Take the least or the smallest number. Children each turn up a card. The one with the biggest number collects the other cards. The child with the most cards at the end wins, or the children may take a number of items corresponding to the numeral on their card, the child with the most items at the end of the game wins.

What number is bigger than three but smaller than five? What is one more than four? What is one less than four? Which is more - 8 or 10?

If I climb three steps and you climb two, who will be higher? How many steps will I have to climb down to be with you?; how many would you have to climb up? If I take five steps along the walk cards and you take seven, who will go farther? What number will you be on if you take three steps forward and one backward? If I roll four on the dice and move my marker four spaces on the gameboard and you roll six, who will be ahead? If one child picks a three card and one picks a seven, who will get more beans? If one child has five pennies and one has two, who can buy more gumballs? If a popsicle costs 6¢ do they have enough together to buy one? to buy two? Who is older - the girl with 8 candles on her cake or the boy with twelve?

Balance heavy and light objects on balance board by pushing light objects farther from center and moving heavy objects closer to center.

Weight Number Weigh blocks on pan balance scale. Does a stack of two and a stack of three blocks in one pan balance a stack of five? a stack of four and one?

EVALUATION

Concept

Number Count a number of objects from left to right, right to left, top to bottom, bottom to top, around in a circle, or in random scattered order. Is there still the same number?

How many dogs are there in their houses? How many are there when they run outside their houses? When they line up at their supper bowls? When they are sleeping in a pile? Did any get lost or did any new ones come? Are there still as many? Return dogs to their houses. If each dog buries his bone under the blanket will there still be as many bones? If one dog runs away and then comes back are there still as many dogs? If one dog stands on his head are there still as many dogs?

Which candy would you rather have -- this o o o o o or
this  why?

Show how old you are with your fingers; are you also "this old" (the same number of fingers presented in a different pattern). How many is this? (Different finger patterns of the same number are presented.)

Put six beads in egg carton compartments. Pick up one and return it to another compartment. Is there the same number? Add a bead. Is there the same number?

ORGANIZATION

Association

Match up pairs of related objects (shoe and sock, dish and spoon, hammer and nail, paper and pencil, needle and thread, doll and buggy). Which two go together?

What goes with this? ("bread", "knife", "coat")

What do you know about winter and summer? Discuss.
Place flannel board objects (snowman, flower, sled, swimming suit, mittens, popsicle) on appropriate side (winter or summer scene).

What do you remember about the story?

What did we see at the farm? Make a picture chart showing barn, tractor, vegetables, cow.

Where would we be if we saw these things? (clown, parade, wagon, tent, peanuts, lion).

What does this (color, smell, texture, taste, sound) make you think of?

What do you think of when I say this word?

If you are going on a trip to the North Pole where it is very cold (the jungle where it rains a lot, the desert where it is hot and dry), what will you take? What can you see and do at school (the grocery store, zoo, city)? If you are going to be a fireman (nurse, etc.) what will you need? What will you do?

Classification

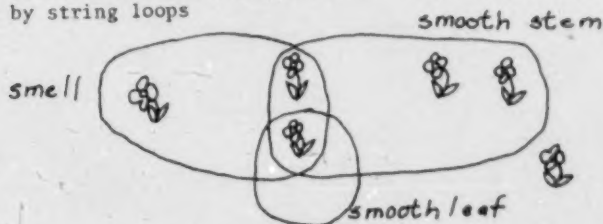
cleaning up - put blocks in cabinet, paper in wastebasket, crayons in box, scissors in can, clay in bag, beds in corner, blankets on closet shelf

group bag of small objects (buttons, shells, matchboxes, pebbles, beans, coins, acorns, peanuts, screw tops from bottles or tubes, corks, spools, fabrics, strings) into large partitioned box. Classify them on different occasions by different criteria such as color, texture, shape, things that have holes and things that do not, things from the beach, from trees, from shops (coins may be put together one time or divided into pennies, nickels, dimes; buttons may be grouped together or divided into black/white or big/little); make verbal observations (All of these are white. This one is soft too. These are the same size. This one has holes like that one.)

ORGANIZATION

Classification contd.

- arrange furniture in a doll house room according to function
- dry silverware and separate knives, forks, spoons into tray
- play Classification Game -- place items in food, clothes, pet, or toy shop
- draw circles around all the dogs (apples, dolls) on animal (fruit, toy) drawings
- put objects into appropriate place (purse, tool box, lunch pail, 1st aid kit)
- divide objects according to whether or not they dissolve in water, roll, bounce, stack, break when dropped, stretch, are hollow, will hold water
- divide a set of objects according to whether they float or sink (cork, pencil, bead, spool, nail, safety pin, pebble, shell, button, penny)
- divide a set of objects according to whether or not they are attracted by a magnet
- divide things according to whether or not they will grow when planted (quick sprouting things should be used)
- divide things according to whether they will melt in a hot oven (ice cube, string, stone, ice cream, paper, snowball, rubber band, bread dough, water, marshmallow, leather belt with metal buckle, plastic car, butter, candle, chocolate candy bar, nickel, pan, aluminum foil)
- Split up a set of toys according to whether they are used inside or outside, have wheels or not, have a pull-string or key, are animals or dolls or cars, have arms and legs or not, make noise or not
- Divide things according to material of which they are made (wood, metal, cardboard, plastic, cloth)
- Collect things on nature walk and classify flowers, leaves, stones; blue, red, yellow, white flowers; smell, no smell; smooth stem, hairy stem; smooth leaf, jagged leaf. Put them in appropriate pens formed by string loops



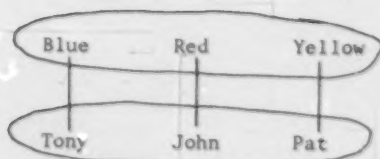
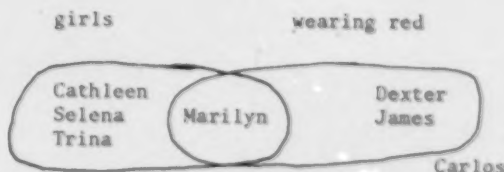
ORGANIZATION

Classification

Sort a collection of dolls or people figures (Attribute Games and Problems Set) in various combinations of tall/short, fat/thin, boy/girl

Divide children's pictures or the children themselves according to whether the child is a boy or girl, is wearing a dress or pants, has pigtails or not; charting, mapping, making tables and other representations of the groups

		
Brenda		✓
A.D.	✓	
Anthony	✓	



WE ARE
WEARING

Tights



Long Socks



Short Socks



Make comparisons. (There are more boys than girls. More children are wearing tights than long socks. More children are wearing short socks than tights.) Adapted from NUFFIELD MATHEMATIC PROGRAM

Is this a coat? Is this round? Is this something to eat?

What is something that is red? something you can rice in? something long? soft? cold? I'm thinking of an animal (fruit, piece of clothing, tool, toy, etc.); can you guess it? (Children are encouraged to ask questions such as "Does it have horns?" and can be given classificatory clues.)

Who is it? All children stand up. All children who are girls stand up. All children who are girls and are wearing red stand up. All children who are girls and are wearing red and have long hair stand up. All children who are girls and are wearing red and have long hair and are named Susan stand up.

ORGANIZATION

Classification

What is it? Take all the toys. Take all the hard toys. Take all the hard toys with 4 wheels. Take all the hard toys with 4 wheels that you can sit in. Take all the hard toys with 4 wheels that you can sit in and it has a pull handle.

Take the spoons on this table. Take the things that are not spoons. Who are the children in the room who are not girls? Show me all the dolls which are not tall, fat, boy dolls. Tell me something that is not to eat. Give me something that is not a ball.

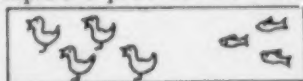
Sort objects by usage (food, clothes, tools, transportation).

Sort clothes by changing criteria - is it for a boy or girl, child or adult, summer or winter, above or below the waist?

If it is an apple then it is (a fruit), if it is a fruit, then it is (something to eat).

Sort objects by touch, smell, sound, taste.

Compare a part to the whole.



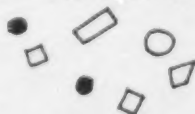
are there more ducks than animals?



are there more white buttons than buttons?

If you take out all the wooden beads will there be any green beads left?
If you take out all the green beads will there be any wooden beads left?

If all the dogs ran away would there be any animals left? If all the animals ran away would there be any dogs left?



are all the circles black?
are all the black shapes circles?
are some of the shapes (animals, flowers, fruit) squares (dogs, blue, bananas)?

Determine inclusive and mutually exclusive groups.

Can a house be a car? Can a daisy be a flower?

Can an animal be a cow? Can a mother be a sister? a son?

ORGANIZATION

Classification

From a set of cat pictures (black and white cats, sitting and standing cats), find the set of all cats, of all black cats, of all sitting cats, of all sitting black cats, of all cats that are not black, that are not sitting, that are not black and are not sitting, that are black but not sitting. Is the set of all white cats the same as the set of cats that are not black? Is the set of all standing cats the same as the set of not sitting cats?

From a set of dollhouse furniture, group all the furniture, all the bedroom furniture, all the furniture you can sit on, all the furniture that does not belong in the kitchen.

Group or set of toy animals by the following categories: a set of cats, a set of dogs, a set of horses, a set of cats and dogs, a set of cats and horses, a set of dogs and horses, a set of all the animals. Are there more cats or more dogs? Are there more dogs or more animals?

Using paper flowers, put only blue flowers in one vase. If this vase is for blue flowers only, can you put a yellow flower in the base. Why not? Put only red flowers in one vase and only blue flowers in another vase. Then put both red and blue flowers in one vase, either red or blue flowers in one vase, all flowers in one vase, all flowers that are not red in one vase, all flowers that are not red and not blue.

Integrate two or more classes: Find a long narrow ribbon. Find the man who is short but fat.

Find the face that is smiling and winking but is not looking straight ahead and does not have a triangle nose.

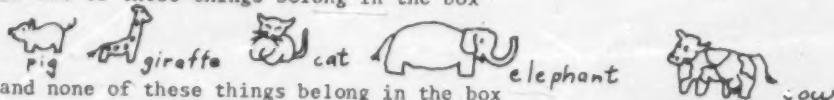
Sort red, yellow, blue, and green solid shapes (spheres, cones, cubes, cylinders) on black or transparent shape cue mats Δ $\square$ $\square$ $\circ$ resort on red, yellow, blue, green, color mats; resort on overlapping shape and color mats.



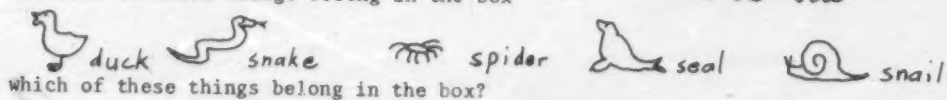
Identify an empty set, a group in which there are no members, (circles that are square, children who are neither boy nor girl, giraffes that fly).

Using three dimensional models:

If all of these things belong in the box



and none of these things belong in the box



which of these things belong in the box?



ORGANIZATION

Correspondence

Match pairs of objects

Match picture of object to object

Tape squares to the table and have the child put an object in each one. Taped squares may be made on the floor, if you wish, so that each child may have between three to five squares to work with.

Larger squares marked off by tape may be put on the floor and each child must find one to stand in.

Pieces of construction paper can be taped to the floor and each child must find one to stand on, either when you tell them to or after they've had some experience, when you ring a bell.

Once the children or some of the children understand what is expected of them in number 3, you may use the idea of stepping stones. The children may walk from one piece of paper or cardboard to the next and should try not to step on the floor. During this time the teacher should explain what the children are doing; "Johnny is on a stepping stone (or a paper) or Tony is on one stone, Cathy is on one stone, find another stone to step on, Cathy has one foot on this stone and one foot on that stone", etc.

String beads in front of the children letting each bead fall the length of the string and hit the other beads already strung. Try to have the children clap each time they hear a bead hit the next one.

Give each child a saucer. Place all the cups in the center of the table (or on the floor if the children are working there). Show the children how a cup and saucer fit together and tell each child to take one cup. Once the children do this, give them two saucers and tell them to get a cup "for this one and a cup for this one".

Give each child three or four jars or plastic containers. Have him place one peg, block, button or bead in each container.

Place 2 chairs if you have three children or 1 chair if you have 2 children in the middle of the room. Ask the children to bring a chair to the table. One child will be without a chair. The idea to convey to the children is that you need one more chair. You are showing the children that if you have three children you need three chairs, thus, a 1:1 relationship.

Marching Activities. Use record player and show the children how to march. Have them step as you clap on the beat. It will take some time for the children to get the idea of marching.

ORGANIZATION

Correspondence

Use strokes or buttons for tallying - are there as many as objects tallied?

Count objects: say one and only one number name for each object, counting each object - not skipping any and not counting any object more than one time.

Set the table: put a doll in each chair, give each doll one plate, put one cookie in each plate, give each doll one napkin, one bowl, one spoon, one cup, one saucer, one knife, one fork. Count each set of objects as they are placed at the table.

Put tissue paper hats on clowns' heads. Blow them away and then replace them on the clowns' heads.

Put up four houses on the flannel board. How many houses are there? If one boy lives in each house, how many boys will there be? The child matches one boy to each house so that every house is filled with one but only one boy. What would happen if there were five boys? If each boy wants a ball of his own to play with, how many balls will be needed? What would happen if there were only three balls? If there is the same number of boys as houses and the same number of balls as boys, is there the same number of balls as houses? Is there more of one or the other? Are there any empty houses? Does every boy have a ball? Are there any balls left over? Put some boys up on the board. Now hide them behind the board. Put up as many balls. Bring the boys out of hiding and match up one-to-one with the balls. Did you remember to put up the same number?

Identity number correspondences: 1 head to a child, 5 toes to a foot, 4 wheels to a wagon, 2 wings to a duck.

Make a qualitative one-to-one relationship between two objects such as a bottle and a bottle cap for which there can be only one cap for each bottle (later establishing a more difficult relationship between two sets of bottle caps).

Take out just enough saucers for all these cups so there won't be a cup without a saucer or so there won't be too many saucers (when the child does not have the concept of number, terms like "the same number" and "as many as" do not have meaning to him). Is there one cup on each saucer? Are there as many cups as saucers?

Add a saucer or taking away a cup in order for there to be enough saucers for all the cups after the teacher has added an extra cup to the two equivalent sets.

Take away a saucer or two or adding a cup or two after the teacher has taken away a cup or two.

ORGANIZATION

Correspondence

Destroy the one-to-one correspondence by putting the cups in the dishpan to wash. (If we put the cups back on the saucers, will there be enough cups for all these saucers or will there be a cup without a saucer or a saucer without a cup?)

Return the cups to the saucers. (Is there a cup for each saucer? Are there as many cups as saucers?)

Place the same number of objects as the teacher has in his row.
 teacher • • • • •
 child - - - - - ? 

Spread one row out and push the other together. 
 (Are there as many black beads as white ones, or more black beads or more white beads? Why? Did you add or take away anything or did you just move the beads? Could you put them back the way they were before (in one-to-one spatial correspondence)?)

Make a one-to-one correspondence which is based on simultaneity and time sequence -- dropping one bead into a container each time the teacher drops one into hers making the hitting sound at the same time until the teacher says "stop". (Do you and I have the same amount?)

Determine if there is still the same amount in both containers if after stopping at the same time (with an equal number in the two jars) the teacher adds one or two beads to her jar or allows the child to drop one extra bead at the start before they drop them together or skips a turn and does not drop one in the middle of the series or drops two instead of one for one turn.

Pour the contents of one of the jars into a container having different dimensions such as a wide flat plate or a tall thin cylinder. (Do we have the same amount? How do you know? If we put the beads back in this jar will we have the same number of beads?)

Check by taking a bead out of each container simultaneously to see whether or not the containers will become empty at the same time.

One-to-one correspondence

Take some eggs from a pile of eggs so that there will be one for each of six egg cups.

Remove the eggs from the egg cups and spreading them out so that the line of eggs extends beyond the line of egg cups; determining if there are now more eggs than egg cups.

ORGANIZATION

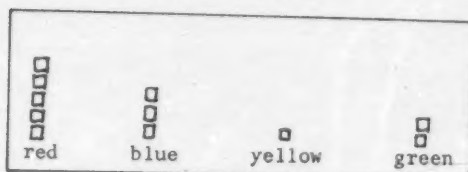
Correspondence

Match one cookie to each child, one blanket for each doll, one brush in each paint jar, one model car to each garage box or two garages of the same color

Use vocabulary -- enough, more than, less than, one each, too many, not enough, too few, as many

Make a favorite color (toy, food, pet) graph in which each child picks one square paper representing his favorite

Favorite Color



Comparing rows of beads --

which row has more? ●●●●●●●●



which row has more?

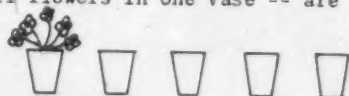


Match flowers to vases --

one flower to each vase -- are there as many flowers as vases?



all flowers in one vase -- are there as many flowers as vases?



randomly distributed -- are there as many flowers as vases?



comparing quantities and matching up one by one to see if the collections have the same number of things in them with the idea that number of objects is independent of their other properties of size, shape, color. (Have you as many crayons as James? Do we have enough candy to give one piece to everyone? Are there more blocks in this pile or that one?)

ORGANIZATION

Correspondence

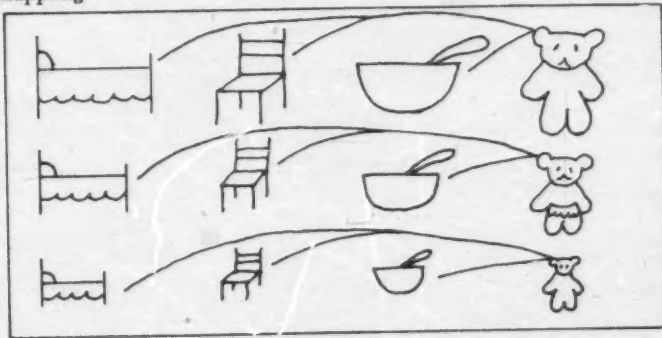
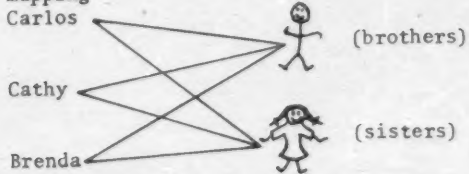
One-to-two correspondence

discussing pairs of objects (We each have two eyes, ears, legs, feet, thumbs. We each wear two shoes, socks, gloves.)

Many-to-one correspondence

putting two blankets on each doll, three flowers in each vase, four chairs at each table

Place pictures of a fire engine, hose, hydrant, helmet, ax under a fireman.
Picture in a pocket chart, pictures of a letter, mailbox, pouch under the postman

Many-to-one correspondence
mappingMany-to-many correspondence
mapping

(Adopted from NUFFIELD MATHEMATIC PROJECT)

ORGANIZATION

SeriationSequence (ordering by time)

Discuss the day's activities from the time we wake up until the time we go to bed at night.

Discuss a single activity such as getting dressed. What goes on first? Then what do you do? Act out activity sequence in charade game: what is he doing (making a sandwich, building a snowman, brushing teeth, washing face, baking cookies)?

Discuss activities in terms of before and after. Before we eat lunch we (wash hands); while we eat lunch we (use a spoon); after lunch we (take a nap). What would happen if you tied your shoes before you put them on? If you put on boots before shoes? What do you do first---get out of bed or go to school? Can you wash the dishes before you put them in the sink? What did you do before you drew the picture; what did you do after you drew it?

Where did we go last week? What did we do yesterday? What are you wearing today? What are you going to bring tomorrow? How old will you be next year?

Tie those objects on a string; which is first, next, last? Which object will come out first when the string is pulled through a cardboard roll "tunnel"?

Children observe the order in which beads are put on a string, pegs in a row, blocks in a tower and describe the order verbally. (First comes a red one ---) The model is removed and the child is asked to reproduce it. The model is returned for the child to check the order. Then a model is constructed behind a screen and the child tries to recreate what it looks like on the basis of the order he is told. The screen is removed for the child to check the order.

Arrange objects in various stages of completion (partially built block houses, partially eaten pieces of toast, partially blown up balloons, partially drawn faces, partially tied shoes) in order according to "What does it look like when you start?" to "What does it look like when you finished?"

If John gets his crayons before Tony and Mike gets his crayons after Tony, who gets his crayons first?

Pictures of what is happening in a story are placed up as the story is told. Children are given pictures in mixed order and rearrange them as they occurred. Children retell the story with and then without the picture clues.

ORGANIZATION

Seriation

Children arrange sequence picture story cards in order without having a story first and make up their own story. They rearrange the pictured event cards and tell different stories according to changes in time of occurrence of events. What might have happened if it started to rain before the picnic? During the picnic? After the picnic? One picture is taken out of the time sequence - what happened in between this and this?

What number comes before three? After three? Follow the number order to draw dot-to-dot pictures. (Start at number one and then go to number two ---). Who is the first, second, third child in line? Place numbered "letters" in order so they can be delivered down a line at numbered mailboxes.

Causality (ordering by time)

Perform physical experiments on objects and observe results (mix blue and yellow paint, put bread dough and an ice cube in the oven, drop an egg, a ball, and a stone, plant a seed and a button, mix sugar and sand in water, place a sponge in water and in sand, blow light weight objects).

Given action, predict result. (What will happen if you pour water into a sieve?)

Given effect, reconstruct antecedent action. (How can you make the color orange?)

Propose possible cause and effect in illustrations of situations. What happened before - why is the girl crying? What will happen next - what is her mother going to do? What happened to the ball to make it look like that? What will happen when the boy tries to play with it? Why is the kitten climbing up on the table? What might happen now?

Verbalize logical consequences of an event for which there has been no previous actual experience. What would happen if the sun did not come up any more? If people had wings, then -----.

Ordering by property activities:

Length - Pull taffy, stretch elastic bands, roll clay, snakes longer and longer.

Height - Watch a candle burn, an icicle melt shorter and shorter. Roll out dough flatter and flatter, build a staircase of blocks, climb to top of jungle gym, go under limbo stick continually lowered or jump over rope raised higher and higher.

ORGANIZATION

Seriation

Surface area -  Block prints on paper.

Weight - Cups of air, popped corn, sand, etc., and pan balance scale.

Temperature - Stick thermometer in soup, milk, ice cream (touch also).

Intensity of hue - Tints and shades of paint samples or mix white and black paint to other colors.

Number - Pictures with one too many animals, cars, people, children's buttons, pigtaails, bag of toys, plates of cookies.

Sound Volume - Whisper to yell, tiptoe to stomp progression.

Pitch - Jars partially filled with water, talk for Papa, Mama, Baby Bear with voice, piano notes.

Tempo - Bounce ball, beat drum, clap, step faster and faster, slower and slower.

Intensity of odor - Paper, soap, onion.

Pressure - Give one nail a light tap, hit the next one a little harder and so forth; push hand into clay gently then harder and harder.

Texture - Sharpen a new pencil. Sand wood blocks from rough to smooth, round off and flatten crayon point by scribbling.

Emotion - Which present would you like best, which would you choose next.

Size - Nesting cups, eggs, barrels, bowls, boxes, stockings, rings, pyramid block squares, variform shape trays, inset rubber shapes.

Size sequence pictures.

Baby-child-adult items.

Various size similar items - milk cartons, manicure scissors to hedge clippers, cardboard rolls.

Children in line.

Montessori depth and circumference cylinders.

Rolling snowballs bigger and bigger, making a snowman of 3 different size balls.

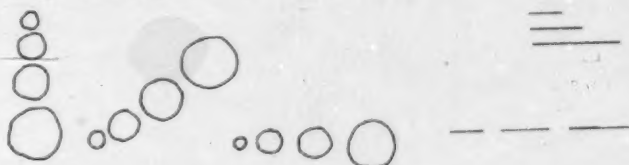
ORGANIZATION

Seriation

Find the flannel board bowl, chair, bed that belongs to each of the three bears.

Match different size clothes, beds, dishes to different size dolls, different size cars to garages.

Arrange row of buttons, jar lids, sticks by size in different directions:



Draw family members in size order.

Ordering by pattern activities:

Fold paper; make symmetrical designs with ink blots or by tearing. Draw a line or shape; hold up a mirror to the end or edge to see symmetrical design.

Analyze a line of children. (Who is in front of Michelle? Who is in front of Michelle and behind Anthony? Who is between Ricky and Charles? Which children are behind (or to the right of) James? Who will be first, next, last?)

Copy a row of shapes.

Model A



Child's row A



What shapes are before (left of) the triangle? What shapes are after (right of) the triangle?

Complete a row of shapes.

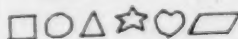
Model B



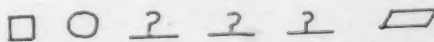
Child's row B



Model C



Child's row C

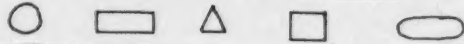


ORGANIZATION

Seriation

Reverse a row of shapes.

Model D

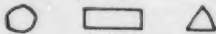


Child's row D



Make a symmetrical series.

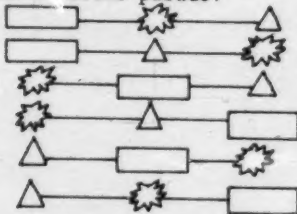
Model E



Child's row E



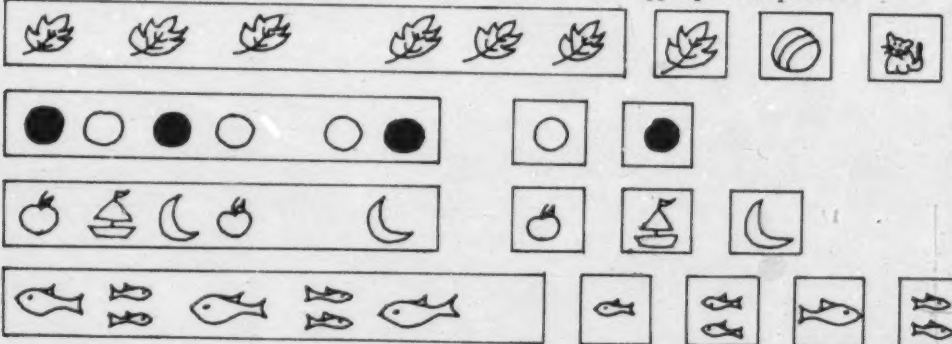
Make all possible combinations of a series of objects. How many ways could a calliope wagon , a lion , and a clown , go in a circus parade?



If Mary is wearing a hat and a coat and boots and she is wearing red and yellow and blue, what might her outfit look like?

	yellow	yellow	red	red	blue	blue
	red	blue	yellow	blue	red	yellow
	blue	red	blue	yellow	yellow	red

Find the picture that is missing and place it in the appropriate place.



REASONING

Analysis

Describe an object, telling everything you know about it. (It is round. It is smooth. It is red. It squishes when you poke it. It rolls. It bounces. You can spin, throw, kick it.)

What can you see in this picture? Can you find a bird in this picture?

What are some things that happened in the story?

List steps in everyday activities (getting dressed, washing hands).

What is missing? (Shoe without lace, cup without handle, car without wheels, clock without hands)

What is wrong in this picture? (Lion's head on man's body, two suns in the sky)

Recognizing a part of a total configuration. Can you find a star like this in the design?

Identify parts of plants, cars, etc., and discuss parts according to function.

What kind of cars are in this train? What animals are at the zoo? What color flowers are in this vase? Who is in your family? What can you see on a farm?

Take apart objects (clock, bird's nest) and examine parts.

How many steps long is this line? How many spoonfuls of beans are in this dish? How many blocks high is this tower? How many cups of milk are in this pitcher?

Fold a piece of paper several times. Open it up and draw on the fold lines to delineate component parts of the whole. Color each shape formed by the lines a different color.



Divide up a box of candy among all the children, matching one-to-one until the bag is empty. Cut a cake into pieces. Split an apple into halves and quarters.

How many children can take two blocks from the pile? Can we each take four? Can you make more towers three blocks high or six blocks high from a group of twelve blocks? If you have five pennies and each cookie costs two pennies, how many cookies can you buy? If there

REASONING

Analysis

are 10 dogs and only three houses, how many might live in each house (8-1-1, 7-2-1, 6-2-2, 6-3-1, 5-4-1, 5-3-2, 4-3-3, 4-2-4)?

If there are five birds and two of them fly away, how many will be left?
If you have three crackers and you eat two of them, how many will you have then?

Synthesis

Here is part of something (button, wheel, pocket, window). What do you think it might be part of? Other parts may be added one by one or partial transparencies overlaid on each other until the whole is guessed.

A picture is drawn on the board bit by bit. What do you think this is going to be when it is finished?

Which (whole) does this (part) belong to? Does this foot belong to the duck or the boy?

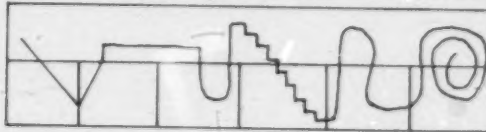
Reveal masked pictures a part at a time. Can you tell what is under here?

Recognize split shapes. Which shape will these two look like when they are pushed together?



Complete a line

Arrange a set of cards with lines (bottom row) to connect with another set of lines (top strip) and form one continuous line.



Fill in a matrix.

		?	?
	?	?	
		?	?

	?	?	?
?		?	?
?	?		?
?	?	?	

?		?
?	?	
	?	?

REASONING

Synthesis

Identify an object from its shadow silhouette, outline, incomplete outline, angle dots



or its form under a cloth or wrapped in paper.

Identify an object by only touch, taste, smell, or sound cues.

Answer riddles. I'm thinking of an animal that has two feet and feathers and swims in the pond and quacks; what is it? What is round and red and bigger than a marble and grows on a tree and can be eaten?

Take three pictures from a magazine and make up a story that contains all three ideas.

Make a sentence out of insufficient or disordered words (dog-bones, My dog eats bones. or red-coat-my-is, My coat is red.)

Put a group of two cows in this pen. Put a group of three horses in this pen. Put them all together in the barn. How many animals are there altogether? We need four chairs at this table. Two chairs are already here. Bring enough/more chairs so that there will be four altogether. If there are three of us and we each have two shoes, how many shoes are there altogether?

APPENDIX VI

MATERIALS

Appendix V

Materials

A large variety of equipment has been used in the educational program. The following list includes specific equipment found to be particularly useful and general equipment lists for each area.

I. Infancy

Sounds I Can Hear: Scott Foresman
1900 East Lake Avenue
Glenview, Illinois

Also: nestling blocks and cups, pull toys, rattles, busy boxes, form boards, large peg boards, large beads, dolls, blocks, trucks, simple lottos, books, shape discrimination box, graduated cylinders, simple puzzles, alphabet blocks, magnetic and felt letters, numbers and shapes, records, large picture cards.

II. Preschool

A. Language

Peabody language development kit, level Part II:
American Guidance Service
Publisher's Building
Circle Pines, Minnesota 55014

Language lotto: Appleton/Century/Crofts
Division of Meredith Corporation
440 Park Avenue South
New York, New York 10016

Building Pre-Reading Skills, Kit A: Ginn and Company
450 W. Algonquin Road
Arlington Heights, Illinois
60005

Also: lotto games, books, picture cards, association cards

B. Reading

Bank Street Readers; Preprimers: MacMillan Company
New York, New York

Also: lotto games (alphabet, beginning sounds, initial consonants), alphabet letters (felt, wooden, magnetic, beaded), word cards, cards to match (picture-picture, picture-letter, picture-word, letter-word), rhyming games, puzzles, pegboards, beads, phonics material, memory games.

C. Math/Problem Solving

Learning Lotto: Creative Plaything
Educational Department
Princeton, New Jersey

Appendix V

Materials

Attribute Games and Problems: Webster Division
McGraw-Hill
Manchester, Missouri
Nuffield Mathematics Project: John Wiley and Son
New York, New York
Perception Plaques: Creative Playthings
Princeton, New Jersey

Also: shape/color (association cards, lotto, dominoes,
graduated boards, puzzles, matching cards), What's
Missing games, classification games, sequential
cards, design cards, sorting boxes, number cards,
number puzzles and boards, pan scale, clocks,
calendars, counters.

General Equipment: Language Master: Bell and Howell
7100 McCormick Road
Chicago, Illinois 60645

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